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Frontispiece
Annals of Medical History
March, 1932

RAYMUNDUS VIEUSSENS DOCTOR MED MONSPELIENSIS ANNUM AGENS XLII

RAYMOND VIEUSSENS

[1641-1716]

[From Dubovrgdiev: Aphorism Prognostici Hippocrates, Romae, 1659.]

ANNALS OF MEDICAL HISTORY
NEW SERIES, VOLUME IV MARCH, 1932 NUMBER 2

THE LIFE AND TIMES OF DR. WILLAM HARVEY[*]

By SIR WILMOT HERRINGHAM, K.C.M.G., C.B., M.D., F.R.C.P.

HAMPSTEAD, ENGLAND

PART I

1. HARVEY FROM 1578–1600

WILLIAM Harvey was the son of Thomas Harvey, yeoman, of Folkestone. Thomas, who was born at Folkestone in 1549, married as his first wife, Juliana Jenkin, who dying left him a daughter, Julian. He married in January, 1577, his second wife, Joan Hawke, or Halke, by whom he had seven sons, called by Fuller "a week of sons," and two daughters. William, the eldest child, was born at Folkestone, on April 1, 1578.

Nothing is known of William Harvey's childhood. At ten years of age he was admitted to the King's School at Canterbury, a very old foundation which had hitherto been governed by the Archbishop, but had been taken over by Henry VIII, enlarged, re-endowed, and placed under the Dean and Chapter. There were fifty boys on the foundation, and others were allowed to come who were not on it, of whom Harvey was one, but all were required to have learned reading, writing and the rudiments of grammar, previously.[†] This, therefore, was not Harvey's first school; he must have been taught in a small grammar school, of which there were a great number in the country, either at Folkestone itself or elsewhere. Canterbury held the position of a modern public school. It had six forms, which read the usual Latin authors in order: Cato, Aesop, Terence, Horace and Cicero, with one or two moderns who wrote in Latin, such as Mantuanus and Erasmus.

[†] In a list of King's Scholars of 1591, the only list of Harvey's time that is extant, his name does not appear (see Woodruff and Cape. History of the King's School Canterbury, 1908). He must therefore have been a "commoner," a scholar not on the foundation.

[*] In the time of Harvey the year began officially on March 25. Thus March 24, 1650, is March 24, 1651, according to our present calendar. Dates have been corrected to accord with the present method.

The upper forms wrote Latin prose and Latin verse, and, as usual then, the boys were ordered to speak nothing but Latin and Greek whether at work or play. The statutes, given to the school in 1541, are still extant.

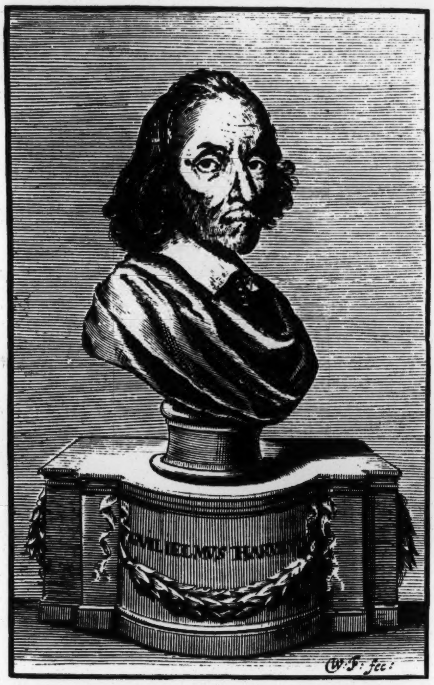

FIG. 1. FAITHORNE'S ENGRAVING AT THE BEGINNING OF THE "DE GENERATIONE," PRESUMABLY DONE ABOUT 1650 WHEN HARVEY WAS SEVENTY-TWO YEARS OF AGE.

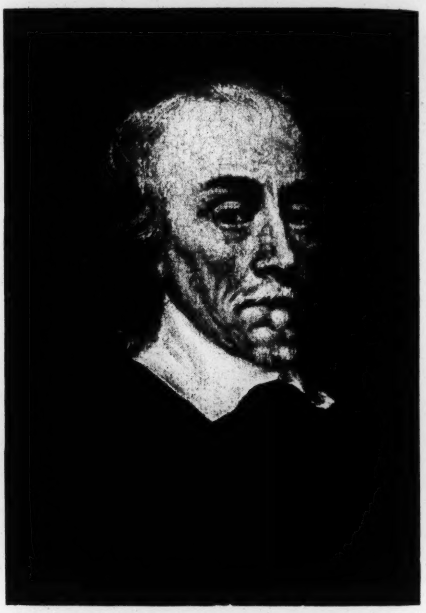

FIG. 2. DR. WILSON'S PICTURE, BOUGHT AT THE SURRENDEN DERING SALE. MARY, HARVEY'S NIECE, MARRIED SIR EDWARD DERING.

Although Greek is mentioned as an alternative, and the head master is supposed to be learned in Latin and Greek, no Greek authors are given in the curriculum, and we may take it that in 1541 it was not taught. Grocyn and Linacre had taught it in Oxford at the end of the 15th century, and Erasmus was invited to Cambridge in 1516. But Greek was the mark of the beast, the new spirit in learning to which all the authorities were opposed, the educational because it attacked the old scholastic teaching, and preferred letters (*literae humaniores*) to logic, the religious because it revived the old pagan names, and adored the old pagan beauties. In spite of encouragement by Fox at Corpus, it had pretty well perished out of Oxford, in consequence of the feud between the "Greeks" and the "Trojans," and at Cambridge the first Greek chair was set up by the orders of Legh, the visitor sent by Thomas Cromwell in 1535. A quarrel about pronunciation between 1540 and 1550 probably did not improve matters. Smith and Cheke following Erasmus, maintained that the modern Greeks had lost the old pronunciation, and in spite of the opposition of Gardiner the Chancellor, and of Caius, who had learned from Greeks in Italy, the pronunciation we now use won the day. The pronunciation of Latin as if it were English also began about the middle of the 16th century. It was not until the Marian refugees, returning with the accession of Elizabeth, brought a new reverence for Greek as one of the Biblical languages, that it gained a secure position. Backed by the strong Calvinist propaganda many of the grammar schools began to teach Greek, and some Hebrew. This movement had had plenty of time to grow by 1588, when Harvey went to a public school, and we may take it as certain that, when he went to Cambridge six years later, he could not only read, write, and talk Latin, but also had a working knowledge of Greek. Latin was then the universal language, and every school taught it colloquially. Montaigne it may be remembered was not allowed to speak anything else until he was six.

From school time-tables and statutes, especially from that of Eton, which have been preserved, we know something of public school life at that time. Boys got up at 5; had prayers at 6, and worked from 6 to 9. At 9 breakfast, probably bread and beer. From 9.45 to 11 school again. At 11, dinner. From 1 to 5 school again. At 5, supper, and bedtime at 8. Their stomachs must have been very empty, and their heads very tired by 9 o'clock, and it was a foolish plan to put off breakfast so late when dinner was so early. But the interval from 11 to 1 must have given them time for a game of some kind.

The prefect system was in full swing, though the prefects (*Custodes*) were chiefly spies to report misdeeds to the masters, and the flogging was most brutal and continual. Ascham, in the "Scholemaster" (1570), was one of the first to advocate teaching by kindness.

Commons for the boys at Canterbury were rated at 10 d. a week. The schools closed for three weeks in the summer, when all boys went home. But at Christmas and Easter, though they had ten days or so without lessons, boys did not go home unless they lived nearby. Travelling was difficult in those days. Though there do not seem to have been any regular half-holidays in the week, Mr. Leach (from whose "Schools of Mediaeval England" I have taken the preceding details) calculates that owing to Church feasts they must have had a whole or a half-holiday almost every week. Each of the greater saints provided a "whole Remedy" (*remedium*) when the present writer was at Winchester.

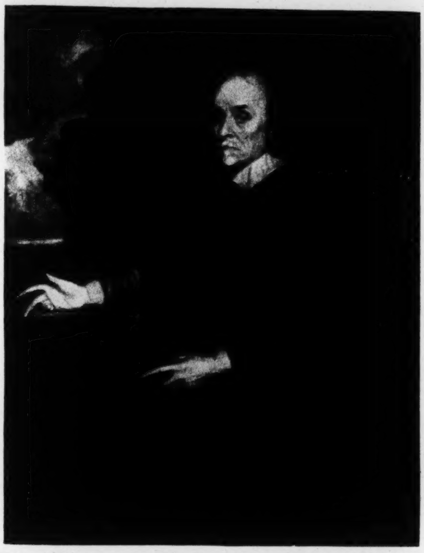

FIG. 3. PORTRAIT OF HARVEY AT THE ROYAL COLLEGE OF PHYSICIANS OF LONDON, ATTRIBUTED TO JANSEN.

It may be added that the rules for getting up were much more severe for schoolboys and undergraduates (see above) than for the servants of a country gentleman like John Harington, who were only required to be out of bed by 6 A.M. in summer, and 7 A.M. in winter.[1]

Harvey entered at Caius in May, 1593. His certificate of entry is still preserved there and runs as follows:

> Gul. Harvie, filius Thomæ Harvie yeoman, Cantianus ex oppido Folkeston, educatus in ludo literario Cantuarensi, annos natus 16, admissus est Pensionarius minor Com. Scholar. ultimo die Maii 1593 sub tutela Mgri Geo. Estey, Collegii Socii, qui pro eo fidejubet. Solvit pro hoc ingressu suo in Collegium iijs. iiijd.
>
> William Harvey, son of Thomas Harvey yeoman, from the town of Folkestone, in the county of Kent, educated at Canterbury School, in his 16th year, has been admitted as Pensionarius minor to the Scholars' mess on the last day of May 1593, under the tutorship of Master [*Magister*] Geo. Estey, Fellow of the College, who goes surety for him. He pays for this his entrance into the College three shillings and fourpence.

A few notes may be added.

Previous biographers, Lawrence, Willis and Power, by placing the comma wrongly before instead of after the word yeoman, have made William the yeoman instead of his father.

Dr. Venn[2] in a valuable note on the "Status of Students in Elizabethan times" tells us that they were then divided into five classes.

1. Pensionarii majores, Fellow commoners, who were generally younger, were richer, dined at the Fellows' table, and seldom took a degree.

2–4. Pensionarii minores primi, secundi and tertii ordinis.

P. primi ordinis were the Bachelors. They had a separate mess, and their commons were rather dearer than those of the other two.

P. secundi ordinis were the scholars in the restricted sense of the term, who received a stipend from the college funds.

P. tertii ordinis were the Commoners, who received nothing.

5. The Sizars, who performed certain menial duties for the Fellows, waited on them, and were fed on what remained after the Fellows had dined.

All Pensioners paid for their Commons. The Scholars had a room or part of a room and College tuition free, at least this is provided in the foundation of the Matthew Parker Scholarship; the Commoners paid for rooms, tuition and commons.

"Com. Scholar." The usual form was "in Commeatum Scholarium," which is what the previous biographers print. But the exact words in the present instance are as they are given here. The preposition may have been omitted in error; if not, it is the dative case, which is possible.

"Sub tutela etc." Every undergraduate was allotted to a tutor who was responsible for his debts to the College (fidejubet), and also for the supervision of his education and conduct. The tutor was selected with some care and was often either a country neighbor or a relation (Venn). (For details respecting Estey see p.113.)

"Solvit 3/4d." The entrance fee was 6/8d. for P. majores, 3/4d. for P. minores, by the Statutes of Caius.

Caius required of scholars that they should write decently, should be able to sing, should know grammar (Latin) and Greek and that they should be asked "an organistæ sint" and "an carmen componant."* But from 1581 the scholarships were not given on admission but after some period of residence. Harvey did not obtain his till Michaelmas.

---

* At some Song Schools choristers were taught the organ. (Ottery St. Mary, Leach Schools of Med., England, p. 194.) Perhaps *carmen componere* meant musical composition.

Up to 1559, that is for a year after the new foundation, there were only six scholarships at Caius. In 1581 there were thirty-one. Caius founded twenty, who received four marks (£2.13.4) yearly, and Matthew Parker, Archbishop of Canterbury, in 1571 gave the College £61.13. 4 to found a medical scholarship for a boy from Canterbury (at Caius' request according to Dean Hook). It was invested in land and produced a yearly stipend of £3.0.8d., "Sine deductione cubiculi aut lectionum domesticarum." It lasted for six years, the first three of which were to be given to studies preliminary to Medicine (*quae ad Medicinam pertinent*) the remainder to Medicine itself (*quae Medicinam ipsam faciunt*). It is the first case of a scholarship for medical training. This was the Scholarship which Harvey held.

A large proportion of Caius men came from Norfolk and Suffolk, some, owing to connection with the Bourchiers, from Devonshire, and a considerable number from Yorkshire.

This last fact is due in Dr. Venn's opinion to the religious opinions of the College. Yorkshire was largely Romanist, and Caius, though permitted to retain the Mastership when other Romanist officials were expelled, was supposed to be of that religion himself. Byng, the Vice-Chancellor, wrote to Burghley on Dec. 14, 1572, that there were in the College many Popish utensils.

> It was thought good by the whole consent of the Heads of Houses to burn the bookes and such other things as served most for idolatrous abuses, and to cause the rest to be defaced, which was accomplished yesterday with the willing hartes as appeared of ye whole company of that house.

Byng accompanied by Whitgift, Master of Trinity, afterwards Archbishop, and Goade, Provost of King's, broke open the room in which the things were kept and smashed to pieces what he could not burn. Caius had for some time been on bad terms with his Fellows on matters of discipline, and they probably also were like the rest of the University, strong Calvinists. They took their revenge. But Caius had reserved the right to nominate his successor, and appointed his friend Legge, who was a High Churchman. Legge was Master in Harvey's time.

Among the Fellows during Harvey's years, 1693–1699, were:

Stephen Perse, M.D., Founder of the Perse School.

Edward Wright, a mathematician.

Thomas Grimston, M.D., anatomist, who no doubt conducted the two yearly dissections for which Caius had obtained a license. Harvey must have attended them.

Robert Church, Lady Margaret Preacher, a friend of Gabriel Harvey.

George Estey, Harvey's tutor, first lecturer in Hebrew on the Frankland foundation of 1575, an incumbent and a divine.

Alexander Roberts, afterwards head master of Lynn Grammar School, and divine.

John Fletcher, mathematician, with a reputation as an astrologer, though not apparently sought by himself.

In the lists of admission from 1590 to 1600 which comprise all Harvey's contemporaries there are very few names which were known in after life. The following may be mentioned:

	Admitted
Richard Parker, Antiquary	1589
Thomas Brudenell, Baron, 1628, Recusant and Royalist, Earl of Cardigan, 1661	1592
Hammond Whichcote, Parly. Commissioner	1592
John Botterill deprived of his benefice by Bp. of Lincoln (Williams) 1622	1593
Wm. Mallory, Royalist, fined £2,219 by Parlt.	1593
Thomas Browne, Romanist, but took Oath of Supremacy	1593
Henry Coppinger, Jesuit	1594
William Denny, M.P. Norwich	1594
Geo. Wharton, son of Philip, Lord Wharton, k. in duel, 1609	1595
Thos. Fotherly, in Household of Chas. I	1596
Sir Wm. Heidon, drowned at Rhé	1597
Thos. Woodehouse, Parliamentarian, M.P. Thetford	1597
John Brudenell, brother of Thomas, Royalist, died in prison, 1647	1597
Thomas Wake, drunken parson ejected 1644	1598
Richard Plumley, Parker Scholar, vice Harvey	1599
George Snell, Royalist, but took the Covenant	1599

These names, though not of remarkable people, show well the division which the religion and politics of the time caused among men at one College, and recall the fictitious characters of the two old friends, Rochecliffe, the royalist Anglican, and Holdenough, the Presbyterian, whom Scott in "Woodstock" portrays as old Caius men.

In the same years, out of 295 men admitted, 114 are described as sons of gentlemen, the remainder being sons of yeomen, as Harvey was, of tradesmen, or "mediocris fortunae." More than one gentleman's son is admitted as a sizar.

We would give a good deal to know how the day of an undergraduate was then spent, but unfortunately that is just the kind of information that is the hardest to obtain. We have to piece it together, and then very imperfectly, from various sources. Between 5 and 6 A.M. Chapel took place.[3] There was a fine for being late or absent. At 6 A.M. lectures began, and continued for four or five hours. Most men in that age took a morning drink of beer or wine with bread. When the students got it is doubtful. Lectures would finish at ten or eleven. Dinner followed. Dr. Lever, Master of St. John's, thus describes it and the remainder of the poor scholars' day, as it was in 1550.[4] He says:

> At ten of the clocke they go to dynner, whereas they be content with a penye pyece of byefe amongest iiii, having a fewe porage made of the brothe of the same byefe with salte and otemell and nothynge els. After thys slender dinner they be either teachynge or learnynge untyll v. of the clocke in the evenynge, when as they have a supper not much better than theyr dyner. Immedyatelye after the whyche, they go eyther to reasonyng in problemes or unto some other studye untyll it be nyne or tenne of the clocke, and there beyng without fyre are fayne to walk or runne up and downe halfe an houre, to get a heate on their feete whan they go to bed.*

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* There are three Sermons in the reprint, all preached in 1650. They are extremely interesting as evidence by a man devoted to education, of the corrupt diversion of funds originally left for this purpose.

So far as the food goes this is not starvation. In 1554 St. Bartholomew's Hospital was paying a penny a pound for beef and mutton, and if Cambridge prices, as is likely, were as low, these boys would be getting half a pound of meat in the two meals beside, no doubt, bread and a few extras.

Mallet gives the prices of commons at the time of foundation of the various Oxford Colleges. Commons for undergraduates were lower than those for Fellows. They were rated:

In the 13th century at 8d. a week.

In the 14th century at 12d. though in the latter half of the century they rose to 18d.

In the 15th century at 16d. a week.

In the 16th century at 12d. and this was the rate at Trinity, Cambridge, in 1556.

At the prices given here for St. Bartholomew's the meat would have cost only 3½d. a week, and there would be 8½d. left over for bread, beer and extras.

With this may be compared the board wages of the Matron of St. Bartholomew's which in 1552 were 18d. a week, and we need not suppose that the matron starved.

Harvey's scholarship was £3.0.8d. per annum, which as we know from the College Computus, or account book, was very nearly sufficient to pay the whole of his commons.[5]

Cold was the great hardship. The boys must have worked in their rooms, for there was nowhere else for them, and it is no wonder they wanted a run to warm themselves. Washing, we may be sure, was at a minimum, as it always is in cold climates. It was probably done at a pump or conduit in the open air, as it was at Winchester not so very long before the present writer was in college there.*

To us, accustomed to the regular part which athletics take in college life, the absence of any regular exercise in Dr. Lever's program is striking.

Earle, however, in his "Microcosmography," published in 1628, describes an undergraduate very differently.

> A young gentleman of the University is one that comes thither to wear a gown and to say hereafter he has beene at the University. His father sent him thither because he heard there were the best Fencing and Dancing Schools; from there he has his Education, from his Tutor the oversight. The two marks of his seniority is [*sic*] the bare velvet of his gown and his proficiency at Tennis, where when he can once play a set he is a Freshman no more. His Study has commonly handsome shelves, his Bookes neat silk strings, etc.

Simonds D'Ewes, who was a devout Puritan and went up in 1618, complains of the frivolity of his contemporaries. It is to be feared that he would make similar complaints even now. But those amusements would be for richer men. Simonds D'Ewes does not seem to have practiced them, but he developed a taste for bell-ringing, when he was at Cambridge, so that pastime was possible. Football gave rise to such a riot in a match with Chesterton in 1579, that the next year all football outside college precincts was forbidden, and in 1595 Goade, now Vice-Chancellor, ordered that "the hurtfull and unscholarlike exercise of Football and meetings tending to that end do from henceforth utterly cease (except within places severall to the Colleges, and that for them only that be of ye same Colledges)," apparently a ban on inter-college matches.

---

* Water was not laid on to "Chambers" before 1837 at Winchester. And at Eton, I gather it was even later (see A. K. Cook, Winchester).

The most curious regulation is the prohibition of bathing and swimming. In 1571 the Vice-Chancellor and the Heads ordered that if any scholar should go into any river, pool or other water in the County of Cambridge by day or night to swim or wash, he should, if under the degree of B.A., for the first offence be sharply and severely whipped publicly in the common hall of the College in which he dwelt, and on the next day should be again openly whipped in the public school (i.e., lecture room) where he was or ought to be an auditor; if he was a B.A., he was to sit in the stocks a whole day. It must have been considered an offence against public decency.

Although by Elizabethan times comfort had spread so far that in a Bachelor's room pillows and bolsters were on the bed and pictures on the walls, and though Robert Devereux, Earl of Essex, when he went up to Trinity (Cambridge) in 1577, paid £7.0.0 for fitting up his rooms, it is doubtful if a poor scholar had a room to himself. Certainly in the earlier half of the century he shared with three or four others. Nor had he yet a fire except in Hall.

One amusement, the acting of plays, was common, and authorized, at the time we are considering. The plays were written and acted by the younger graduates, and were given in the Halls either at Christmas or on the occasion of a royal visit. They were usually, but not always, farces on the model of Plautus, and commonly contained a caricature of some person well-known in the university. Palamon and Arcite was played before Elizabeth at Oxford in 1566 and as part of Theseus' hunting there was a cry of hounds "upon the train of a fox" (Wood) which excited the students to the Queen's great delight. "Gammer Gurton's Needle" was played the same year at Cambridge. In 1597 Clare gave a play called "Club Law" to which they invited the Mayor and Corporation and their wives, and seated them carefully in the middle. The play was an amusing skit on the town authorities, who being surrounded by students could not make an exit, and had to sit the play out. The Mayor complained to the Privy Council, and the Council proposed to come down and see it, but the Mayor thought it better to drop proceedings. In 1602 the "Return of Parnassus," well-known for its reference to Shakespeare, was played; in 1615 one of the plays given at James' visit contained a caricature of Sir Edward Ratcliffe his physician, and another was "Ignoramus" in which Brakyn the Town Recorder was satirized.

But though domestic theatricals were permitted there was the strictest prohibition of professional acting. Lord Oxford's, and Leicester's troupes were both refused permission in 1580, and even the Queen of Bohemia's company in later times.

The turbulent spirits of youth which, in modern days, have been diverted to athletics, found in the Middle Ages, and even in the 16th and 17th centuries, less desirable outlets.

In early times the Universities were terrible places for fighting; there were pitched battles between the Nations, and between North and South, besides quarrels between Colleges, within the University, and there were still fiercer fights, sometimes led by the authorities themselves, against the town, in which men were not infrequently killed. Cooper[6] under the year 1575, quotes a letter in which the fighting between town and gown is described as continual, and that the antagonism was not confined to undergraduates is shown by the statement that when University men walk the streets they will take the wall of everyone, whence the proverb that a Royston horse and a Cambridge M.A. are a couple of creatures that will give way to nobody.

At Oxford, Christchurch and Exeter were at such violent feud that in 1630 Duppa excused the Christchurch men from responding in the Schools for fear of the consequences, and in 1637 they were still enemies, the masters wrangling in the Schools and the students fighting in the streets.[7]

Poaching was as old and as popular as fighting. As late as 1586 Lord Norreys came with a party of men to Oxford to complain to the authorities that one of his keepers had been killed. The undergraduates mustered on Magdalen Tower and stoned his party as they rode out by the bridge, inflicting considerable injuries. In 1627 the King wrote to the Vice-Chancellor ordering him to expel certain undergraduates who had been killing his game at Woodstock (*Cal. S. P. Dom. Charles* I).

Drunkenness was inveterate from the earliest times to the 17th century. The visit of James to Oxford, in 1605, led to a great increase of it, and in 1639 the scholars, being hunted out of the alehouses by the Vice-Chancellor, took to bibbing and gaming in their own rooms.

During James' reign orders begin to appear at Cambridge against tobacco smoking, which seems to have been extremely common then among men, and occasional even among women. In 1607 anyone convicted of excessive drinking or taking tobacco in public taverns or shops at night is to be expelled, and anyone smoking in St. Mary's at commencement, or in the Schools, or in any dining hall, or when plays are being performed, is to be fined 6/8d. The order was repeated in 1615, before the King's visit, and again in 1631.

Smoking in St. Mary's does not seem to have occurred during divine service, but during University ceremonies. But there is an order in 1595, forbidding students to be covered during the sermon, and a complaint later (1636) that though the University is uncovered at such times, the townspeople wear their hats, which reminds us of contemporary Dutch pictures of Church interiors, where the congregation are listening to the preacher with their hats on.

From the earliest times students had been noted for extravagance in dress, and this still continued. In 1578 Burghley forbade "hoses of unseemly greatness," (i.e., trunk hose) excessive ruffs, apparel of velvet and silk and the wearing of swords and rapiers.

In 1602 his son, Robert Cecil, makes a similar complaint. In 1615 there is a decree:

> . . . Consideringe the fearfull enormitye and excess of apparell seene in all degrees, as namely, strange pekadivelas [piccadillies, some kind of collar attached to the doublet], vast bands, huge cuffs, shoe roses . . . it is straightly charged etc.

and in 1636 Laud was informed that men were wearing gowns of all colours instead of the regulation black, "round rustic caps if they wear any at all," and other garments light and gay, some with boots and spurs, others with stockings of diverse colours.*

Their hair also was ordered in 1560 to be polled, notted (shorn), or rounded, and in 1615 "tufts locks and topps of hare" are forbidden.

Idleness and insubordination of various kinds are a continual source of complaint. Elizabeth and Charles both wrote to the Chancellor of the day, and Parliament complained about it. Burghley actually resigned three years after his appointment on account of it, but was persuaded to stay on. Shirking Chapel and Hall, and refusing to wear surplices, are specially mentioned, but disobedience to regulations was widespread, and in 1587 Burghley writes that Tutors have too large a stipend, that they neglect their pupils and are afraid of them, and that poor people cannot afford to send their sons to the University.

Harvey took his degree in Arts in 1597 but there are no details available of that, or of his subsequent work at Cambridge on more purely medical subjects. His scholarship was last paid at Christmas, 1599. But whereas for the first three years he was hardly ever absent from college, during the last three, 1596–1599, he was away for as much as sixteen months altogether, and once as long as two months at a stretch. His absences were apparently due to ill health.†

In order to complete the connection of Harvey with Caius, the following record is inscribed here. In the year 1617 the "Annals of Caius" contain a notice that the Earl of Suffolk (Thomas Howard), Chancellor of the University, was appealed to by the Fellows of Caius, who had passed a resolution that the Master, William Branthwayt, had neglected his duties, and that he be asked to resign. The Chancellor summoned them to Audley's Inn (Aedes Audlianae), now Audley End, which had been largely built by his uncle and predecessor, the Earl of Northampton, and decided that the Master had committed many serious offences which he must rectify, and among others "that he must hand over to the College Chest Dr. Harvie's 100 li. and that it be imployed with all convenience and speed to provide land for the maintenance of a Scholler."

This, however, was not carried out till ten years later, when a parcel of land at Bassingbourne was bought for £180, of which Harvey's gift provided £100, the College Chest the rest. The value of the scholarship was fixed at £4.10.0. But the rent of the land was £11.0.0, so that the College for its £80 got £6.10.0 and the scholarship for its £100 got £2 less. On May 6, 1628, "Edwardus Baldwinus, Suffolciensis, electus scholaris primus, ex fundatione Doctoris Harvey."[8]

Harvey does not mention Cambridge in any of his writings, nor do we hear of his going there after he had taken his degree. He did not mention the College or the University in his will.

II. UNIVERSITY TEACHING IN HARVEY'S TIME

Medicine did not form part of the Arts course in Medieval times. The Trivium, Grammar, Logic and Rhetoric, and the Quadrivium, Music, Arithmetic, Geometry and Astronomy, led to the degree of Master of Arts at the end of seven years, and most men took that degree before they began the study of Medicine. At Oxford a course of four years was then required to become a Bachelor, and two years more to become a Doctor of Medicine. Each degree in Medicine was attended with similar disputations to those in Arts, which took the place of our examinations.

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* Hoses of unseemly greatness, stockings of diverse colors, and round rustic caps form the dress of about half the undergraduates nowadays.

† Barlow.[5] Information derived from Dr. Venn.

At Cambridge the statute ordered that no one should be admitted to a degree in Medicine unless he had first taken his M.A. (*in artibus rexerit*), and had for at least five years, in that or some other university, attended a course in Medicine including lectures on "libros non commentatos," viz.: Johannicius, Philaratus de pulsibus, Theophilus de Urinis, Isaac, and the Antidotarium of Nicolaus, and "libros commentatos" Tegni Galieni, the Prognostics and the Aphorisms of Hippocrates, and the Regimen Acutorum, and had lectured on (*legerit*) at least one book of theory and one of practice, had opposed and responded in the Schools, had been exercised in practice for a year, had a good character, and had been approved by the Masters in his faculty. A later clause extends the term of practice to two years.

Hippocrates and Galen were the chief authors, and in an account of Cambridge drawn up by, or for, Sir Robert Cecil, when he became Chancellor, in 1601, the duty of the Queen's Reader in Physicke (Regius Professor), then Sir William Ward was, "to read and to interpreate Hippocrates and Galen in such sort as shall seem meete for his auditory."

Chaucer mentions several other authors whom his Doctour of Phisik had read, and says of him:

> In al this world ne' was there non him lyk
> To speke of phisik and of surgerye
> For he was grounded in astronomye.

Up to the sixteenth century the belief in the influence of the stars on human life was so universal, that astronomy was considered a necessary part of medical education, and though by the seventeenth century, it had been discredited, Fletcher, a Fellow of Caius in Harvey's time, was asked for an astrological opinion, and Aubrey believed in the science.

Lectures were given by the resident Doctors of Medicine, but there was sometimes a dearth of teachers, for in 1414 there was only one at Oxford, and he was a foreigner.[9]

Anatomy seems to have been hardly taught at all, and it is uncertain what practical instruction was given.

At Oxford, up to the sixteenth century, Medicine seems to have been a small and struggling faculty, and few facilities were given to it. When Merton was founded (1274), Fellows were allowed to study Medicine. This was forbidden in 1284 by Archbishop Peckham, but seems to have been allowed again later, for several physicians, John of Gaddesden, John Ashenden and Chamber, physician to Henry VII and Henry VIII, were Merton men. William of Wykeham allowed two Fellows of New (1379) to study Medicine.

Surgeons could obtain a license to practice, but not a degree.

In the early years of the sixteenth century Linacre's bequest founded two lectureships in Medicine at Merton and one at Cambridge, but they seem soon to have become ineffective. Wolsey contemplated founding a Professorship of Physic in his College, and in 1546 Henry VIII founded a Regius Professorship of which the first occupant was Dr. John Warner, Warden of All Souls. The Visitors of 1549 made drastic reforms at Oxford, and by their statutes a student of Medicine was obliged to study six years, to dispute twice, to respond once, and to see two anatomies before securing his M.B. He had to perform two anatomies, and to prove that he had effected at least three cures, before he was admitted to practice, and apparently to see two or three more anatomies, to dispute twice, and to respond twice, for his Doctor's degree.[10]

James I added the Mastership of Ewelme Hospital to the Chair of Physic, and in 1624 Tomlins endowed a Lectureship on Anatomy which was to be held by the Physic Professor.

At Cambridge by the statutes of Gonville and Bateman (1348) two Fellows were allowed after taking the M.A. to study medicine. At King's (1440), of 70 Fellow-Scholars two were allowed the same privilege. In 1540 a Regius Professorship was founded with a salary of £40, the first Professor being John Blythe of King's, M.D. of Ferrara, a brother-in-law of Cheke. In 1546 Trinity was founded, and of 60 Fellowships two were allotted to Medicine. In 1549 the Visitors ordered that non-Regent Masters of Arts were to study Theology, Hebrew, Law or Medicine if they wished to stay at the university. Previously, in 1535, the Universities had been found full of parsons who preferred the social amenities of Oxford and Cambridge to the cure of their parishes. In 1558 Caius refounded Gonville, and of the three Fellows on his own foundation two were to study Medicine and might go abroad for the purpose. He mentions Padua, Bologna, Montpellier and Paris as good schools. He refused a like permission to other Fellows, because their studies could be as well pursued in England, which shows that medical education here was inferior to that in other countries, and in other professions in England.

Matthew Parker, the Archbishop, left an endowment for a medical scholarship at Caius, the first of its kind. The Elizabethan Statutes given to Cambridge in 1570 permitted a man to take the Medical degrees without previously taking the Arts Course. Harrison (quoted by Cooper[6]) writing in 1577, states that "a man may, if he will, beginne his study with the Lawe or Physicke so soon as he cometh to the Universitie, if his knowledge in the tongues and rypeness of judgment serve therefore." In that case "he performs such actes in his own studies as the Bachelors of Divinity do." By that time therefore a man might specialize in Medicine without taking an Arts degree.

But the whole subject was in a most unsatisfactory condition. Indeed the teaching of medicine in England up to the nineteenth century was a national disgrace. Except for the formal lectures mentioned here there was no attempt at medical instruction at Cambridge until Sir George Paget became Regius Professor (1872) or at Oxford until even later. Clinical instruction in London began as private classes conducted by a few leading men in the latter half of the eighteenth century. Before that time men took their first degree, the M.B., at the University, and were then obliged to go abroad to obtain the practical teaching which was not to be found in England.

Moreover, the granting of degrees was managed in a very improper and corrupt fashion.

In 1634 the College of Physicians wrote to Collins, who was Regius Professor at Cambridge, and also a Fellow of the London College, complaining that the degree was given to unfit and ignorant persons. Collins acknowledged the abuse, but said that it was only natural that the University should be indulgent to its alumni and should be a little blind to their faults. "Perhaps," he went on, "you will say it is my fault that so many analphabetarii licentiati are sent out by us." He makes the excuse that if he refused their exercises they had only to go to two other doctors. Every learned Society had fools in it, and the College need not complain. Collins died that year and in 1635 Winterton, the new Regius Professor, wrote to the college complaining spontaneously of the scandalous way in which the M.D. was given:

> Incorporation being obtained by a little summe of money which by orderly proceeding would take twelve years study in the University, besides performing of exercises and much expense. In the University at this time I do protest I do not know any one that intends the studye of Physick and practice thereof according to the Statutes. Chirurgeons and apothecaries are sought unto, and Physicians seldom but in a desperate case are consulted with, when the Patient is ready to die.

He asks the President to urge Clayton, the Regius Professor at Oxford, to move in the matter there. In 1637 the College ordered that no one should be admitted a Fellow who had not performed all his exercises and disputations in one of the Universities without dispensation (*sine gratia*). The unsatisfactory character of the University degree goes far to justify the College in rigorously maintaining its sole right to grant licenses to practice in town.

Nor was the general education in Arts satisfactory. The decline in classical studies, especially in Greek, has been already mentioned (see p. 110), and though Greek had been established in Harvey's time, Mullinger considers that it was still much neglected, that there was hardly any history taught but that of Greece and Rome, and that Civil Law had long been declining. In 1628 Fulke Greville, Lord Brooke, wishing to improve the study of history, founded by his will a new chair to which he invited the eminent Dutch savant, Isaac Dorislaus. But the University authorities considered that, since he came from a republican country, his opinions might be dangerous, and the opposition roused against him was so great that he resigned. The main intellectual interest in the University, as in general society, was polemical theology. It had begun with Cartwright in 1571, and continued unabated to the time of the Commonwealth. University preachers were constantly censured, now in one direction, now in the other, according to the opinions of the Archbishop of the day.

It was indeed a difficult task for a man in those days to act according to his conscience. Elizabeth's Oath of Supremacy and Act of Uniformity had caused many to resign. The Canons of 1604, to which James, in 1613, ordered all doctors of the University to subscribe, were a fresh burden.* These were abolished by the Long Parliament and the National Oath and Covenant, Presbyterian in religion, but including allegiance to the King and Constitution, was substituted, and lastly, on the abolition of Monarchy, the Engagement of Fidelity to the republican form of Government was exacted. This was refused by the Chancellor of the

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* They included the obligation to wear surplices and to take the Sacrament kneeling.

University, the Earl of Manchester, himself.

To return to the subject of education. About the middle of the seventeenth century several criticisms appeared. In 1649, John Hall published "An humble motion to the Parliament &c," in which he complained of the medieval character of the course. There was no recognition of the natural sciences, such as chemistry, botany and even anatomy, while history was badly taught, and archeology not at all. Even mathematics and the classics were neglected, while ethics was nothing but Aristotle. Hobbes in "Behemoth" declaims against the "Aristotelity" which, he says, prevails, and Webster in 1653 makes some foolish criticisms, and some still more foolish claims. His pamphlet ("Examen Academiarum") is interesting only for a sentence: we are, he says, teaching nothing but Galen though "our never sufficiently honoured countryman Dr. Harvey has advanced the study of Anatomy." His value as a critic is somewhat discounted by his complaint that Astrology is neglected, natural magique persecuted, and the mystical Anatomy of Dr. Fludd despised.

Seth Ward, in the "Vindicia Academiarum" (1654) made mincemeat of Webster, and though he treated Hobbes with more respect he remarks, "About that time when Mr. Hobbs was conversant in Magdalen Hall the Constitution and way of the University might likely be enclining to his character of it, but now his discourse seemes like that of the seven sleepers." He states that Aristotle, though honored and taught, is freely criticized, that inductive reasoning is studied equally with the syllogism, that Arithmetic and Geometry are taught profoundly, Optics has been lately a subject of research, and Astronomy is up to date.

> The mischief is, we are not given to Astrology, and as for Natural Magique notwithstanding this lamentable persecution, I dare adventure my life, that Mr. Webster may pass safely with this Examen, carrying it either in his pocket or in his hand or in his mouth, through both the Universities of this Nation, the several Colleges of Eaton, Winchester, etc., the College of Physicians at London and all the rest (provided he have a care how he pass by the College at Bethlem) without any danger of Bell, Book or Candle, Fire, Sword or Execration.

Chymistry is not neglected at Oxford. Funds have been provided and several men are working at it. He then passes to the criticism that we have not altered the teaching of Medicine in accord with the modern discoveries and he answers it thus.

> The practice of Physick hath been bottomed upon experience and observation. And that is the reason that the discoveries of the Circulation of the blood, of the *venae lacteae* both Mesentericall and Thoracicall, of the *vas breve*, and severall new *ductus*, *vasa lymphatica* etc., have not made an alteration in the practise of Physick answerable to the advantage they have given to the Theory.
>
> And the College of Physicians at London is the glory of this Nation, and indeed of Europe, for their learning and felicity in the cures of desperate ulcers and diseases, even of the cancer, and those he* [ignorantly] mentions which have been diverse times performed by Dr. Harvey and others.

He adds, "It is a real designe amongst us wanting only some assistance for execution, to erect a Magneticall, Mechanicall and Optick

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* i.e., Webster.

Schoole furnished with the best Instruments."

The treatise which is prefaced by a letter from N.S. and is in form a reply by H.D. (the last letters of the names John Wilkins and Seth Ward) is not only amusing, but is also valuable, since it shows that there was at Oxford a high appreciation of the different branches of science. The provision made for "Chymistry," and the scheme for a Physics Laboratory as soon as funds can be got, might have been written today for the spirit they profess, and if, as Hobbes said, though untruly, Gresham had attracted all natural science to herself, it was from Oxford and Cambridge that she had drawn the professors to teach it.

The criticism of William Dell was of a different kind. It is a postscript to a treatise called "The Triall of Spirits, etc.," and contains several proposals with most of which Ward agrees. Dell wished that schools should be set up in all villages to teach English and the Bible, others in towns for Latin, Greek and Hebrew, and Universities in large towns such as London, York, Bristol, Exeter, Norwich and others in addition to Oxford and Cambridge, which should teach Mathematics, Physic and Law.

These proposals show a liberal and far-reaching view which was not carried out until late in the nineteenth century when provincial universities began to be established.

But Dell went on to complain of the licentiousness and profaneness of the Universities. Ward replies that Oxford is neither licentious nor profane, but that Dell is charged by common fame "to have a studyed designe [by letting fall all discipline] to let in license with its usual traine both into Cays College [of which Dell was Master], and that other University."

Dell was not only a fanatic but an eccentric as well, and his evidence on the wickedness of the University is about as valuable as that of Simonds D'Ewes. Nor must we omit Milton's "Treatise on Education" addressed to Hartlib. It is not very original. He quarrels with the usual method of teaching Latin and Greek by grammar and composition, and he proposes institutions to hold 100 scholars which shall be both schools and colleges teaching from the school level up to that of the M.A. He includes a good deal of science, and a good many technical subjects, agriculture, engineering, and navigation for instance, in the course, and about an hour and a half's daily exercise in learning the use of their weapons (Milton was a competent swordsman himself), and wrestling. He had educated several boys, and his views are just those of a man who has had a small class and has been able to give special attention to them in consequence.

But besides these criticisms of teaching there was complaint also of the expense of university life. In 1642 both Manchester and York petitioned for a local university, partly on that ground, partly on account of distance. In 1643 the Assembly of Divines asked for a University at London.

The early part of the sixteenth century had been a time of great trouble for the universities. They were then almost entirely ecclesiastic in their aims. The colleges had been founded to train ecclesiastics for the service of the Church and of the State, and the great majority of undergraduates were intended for Holy Orders. But the Church had been so pillaged by the Crown and by her patrons, both lay and ecclesiastic, and the upper clergy had become such pluralists, that the prospects of making a decent living were very small. The worst example of pluralism was that of Wolsey himself, but the practice was defended by Bancroft and was rife in Stuart times also. Spencer in "Mother Hubberd's Tale" tells us:

For some good gentleman that hath the right
Unto his Church for to present a wight,
Will cope with thee in reasonable wise;
That if the living yerely doo arise
To fortie pound, that then his yongest sonne
Shall twentie have, and twentie thou has wonne.

Laud tried to stop his bishops from cutting down the trees belonging to the See and pocketing the proceeds, and a report was presented to the Long Parliament on the parish of Wokingham, in the gift of the Dean and Chapter of Salisbury, who had leased the rectory to a layman for life, with the result that, as there was no vicarage, the parishioners had for several years been compelled to pay a preacher out of their own pockets (*Journal of House of Commons*). It was an age of universal pecuniary corruption, in which the upper clergy, with some honorable exceptions, shared.

As a result the number of students had sunk very low both at Oxford and Cambridge* and in addition by the dissolution of the monasteries they had lost all the exhibitioners who used to be sent up by them.

There were repeated injunctions by the Tudors that clergy whose benefices were worth £100 a year should contribute £3.6.8d. out of every hundred pounds to support a poor scholar at the university.

Elizabeth had altered this. Partly from vanity of her own accomplishments, and partly out of a real love of learning, she began the system of Royal visits to the universities which the Stuarts continued and thus made the universities fashionable. She herself, determined to keep her expenses within her income, gave nothing, but her courtiers did, and the sons of rich men and nobles flocked to the colleges, which thus became what they have been ever since, representative of all but the lowest classes in the country. (See the figures for Caius p. 114.) The numbers at Oxford were said to have been below 1000 about 1550; they were 2500 by the end of her reign.

But it was not an unmixed blessing. These rich boys brought with them the habits of their own class, and we can well understand that though the poor scholar remained as before, the general standard of expense would be likely to rise.

A few instances of an undergraduate's expenses are known. Mullinger[11] quotes from a MS. source the case of a Norfolk squire named Wilton who allowed his son £30 a year. Simonds D'Ewes had £50 a year, and Alice Thornton's son after the Restoration cost her £100 a year, but he was a spendthrift. At the end of the sixteenth century Sir Thomas Smith, a Fellow of his College, writes that for £30 he can keep three horses and three servants.

Extravagance however, as some of the complaints indicate, was by no means confined to the undergraduates. Fellows were accused in 1587 of wearing "satin doublets, silk and velvet overstockes, gownes faced with velvet and satten to the grownde and great fine ruffs," and under Charles of "frizling" their hair and wearing shoe roses. But they did a good deal worse than that. In 1602 Cecil, succeeding his father as Chancellor, complains of the negligence of Tutors, of the neglect of disputations and lectures, and of the scandalous way in which degrees were given. "Nobiles et quasi-nobiles" had always been allowed to have dispensation (*gratia*) from the Acts necessary by the Statutes for a degree, and when they condescended to take a degree took it merely by paying the fees. But this gradually spread until as is described by Winterton any person, even the most ignorant, could obtain a degree for "a little summe."

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* Fuller, 1542–3. "There was now a general decay of students, no college having more scholars therein than hardly those of the foundation."

Nor was this all. In 1576 an Act was passed restricting college leases to twenty-one years or three lives, and forbidding renewal before the time, in order to prevent the Fellows from pocketing large fines derived from long leases at low rents. A bill was even brought forward then, and again in 1625, forbidding the sale of fellowships, headships, and other college offices. Heads of Houses nearly always had a cure or some other appointment, and often resided out of their university for the greater part of the year. Brent, for instance, Warden of Merton for twenty years, lived in London. But as with the Clergy, so with the Dons, there were always some who played their parts conscientiously and kept up the reputation of the university.*

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* I have relied on Mallet and Wood for Oxford, and on Fuller, Cooper, Bass Mullinger and Venn for Cambridge beside the authorities quoted in the text.

(*To Be Continued*)

From Boyle: Opero Omnia.
Venetiis. 1697.]

REFUTATION OF ILBERG AS TO THE DATE OF GALEN'S BIRTH

By JOSEPH WALSH, M.D.

PHILADELPHIA, PA.

IN an article entitled "Date of Galen's Birth"[1] I brought forward arguments to show that Galen was born on or about September 22, 130 A. D. In an answer entitled "Wann ist Galenos geboren"[2] Johannes Ilberg took exception while endeavoring to prove that the birth took place in the summer of 129, and by summer he evidently meant July or August.

According to both Ilberg's and my chronology of Galen's life, this variation in date of birth changes his relation to people and circumstances so little that the subject is of almost no importance. Yet Galen himself took such pains to acquaint posterity with the exact date not only of his birth, but of his activities that some insistence on my part may be condoned. In addition, though other biographers have rarely placed his birth in 128 (Goulin[3]) and 131, it may be confidently stated that the only dates worthy of consideration are 130 and 129.

Ilberg likewise takes exception to my date of Galen's visit to Palestine and Cyprus. Though this is not necessarily related to the date of his birth, it is of such importance that I have taken up again the proofs and demonstrated my previous conclusion.

In spite of my disagreement with Ilberg on these questions I hasten to acknowledge that he called attention to a double error I made in translation which continued through several papers. It is also a pleasure to state that there is nobody who has delved into the life of Galen with more assiduity and with more success. In fact so much of my knowledge has been brought about through his research that I am forced to mention him in every article, and his pointing out of definite inaccuracies proves no humiliation.[4]

Though Ilberg's answer to my article was published in July, 1930 I ran across it for the first time in May, 1931. With my great respect for his research I could not help being impressed with his arguments. Hence I wrote at once a short note stating I would look up again my references, and if I was wrong I would be glad to make correction in future papers. Gathering together these references I sent them in the hope that we could come to some agreement. To my great regret my registered letter was returned with the information that Professor Ilberg was dead. Out of deference to his memory I am publishing this letter exactly as it was sent to him, except that I have introduced references which it is quite obvious Ilberg would not require.

Philadelphia, Pa.
July 28, 1931.

Dear Professor Dr. Ilberg,

I surely made a stupid blunder in stating that Galen returned from Alexandria about the age of twenty-eight (when it should have been twenty-seven), and that he was appointed physician to the gladiators at exactly the age of twenty-nine (when it should have been twenty-eight). My experience is, however, that I have never made ten consecutive statements in my entire life without one of them having been wrong or at least questionable. Hence, though chagrined, I am not surprised. Yet it is a satisfaction to have this error called to my attention by you whose unparalleled work on the consecutive order of Galen's writings I have always admired so much that my sentiments have been those of pupil to master. This blunder, however, does not change the date of his birth, but only lessens the time he spent in Smyrna and Alexandria by one year.

It is almost, therefore, with regret that on looking up my references I find I cannot agree with you in regard to the month or the year of Galen's birth, and instead of having been born in the summer of 129 as you state, I still contend he was born on or about September 22, 130.

In the following pages I discuss the entire matter under the following headings:

i. The month of Galen's birth.

ii. The year of his birth. My reasons for believing 130 A.D.

iii. Galen's activities in Rome on his first sojourn according to my chronology of his birth in September 130.

iv. His journey from Rome to Cassiope in Corfu shortly before the return of Lucius Verus in 166 A.D.

v. His visit to Palestine and Cyprus.

vi. Discussion of the passage in De Libriis Propriis from which you conclude that his birth was in 129.

vii. Discussion of Galen's statement about the consulship of Claudius Severus.

viii. My chronology of Galen's Life.

I. THE MONTH OF GALEN'S BIRTH

My translation of the passages referred to by you relating to the month of his birth and taken from the Greek of the Kuhn and the Aldine editions is as follows:

Kuhn xiii, 599:

> On my return from Alexandria to my native land while still a young man in my twenty-eighth year I had the good fortune to think out a cure for wounded tendons. I exhibited the medicaments I had discovered [for this successful treatment] to physician friends not only in Pergamum, but in neighboring cities so that they might confirm my statements by experiment. This treatment coming, I know not how, to the knowledge of the pontifex of our city he entrusted me with the care of the gladiators while still a young man in age. For *I was arriving at* (ἠρχόμην imperfect tense signifying continuing action; Junta Latin translation tum primum attingebam) my twenty-ninth year . . . Since many died in previous years [and] not one of those treated by me died, the succeeding pontifex to the one who entrusted me with the care of the gladiators, appointed me *likewise*[6] for the space of *seven months*. For the first became pontifex *about the autumnal equinox* [September 22], the second at the full bloom of the early year [therefore about April 22d, since it was seven months later].
>
> Following this, all [gladiators] continuing to be preserved, the third and the fourth and the fifth [pontifex] appointed me *in the same way* the care of the gladiators so that I had much experience in treatment.

This indicates that after he returned from Alexandria at the age of twenty-seven, he experimented with his treatment of wounded tendons. Coming to the ears of the Pontifex of Pergamum who was responsible for the gladiatorial games and the treatment of the combatants, he appointed Galen physician to the gladiators as he was arriving at his twenty-ninth year (in other words the age of twenty-eight).

Since he was appointed as he "was arriving at the twenty-ninth year" the appointment being "for seven months," and since the first pontifex assumed office "about the autumnal equinox" (September 22) and the second pontifex "at the full bloom of the early year" (April 22), it is evident that Galen was appointed at the time the first pontifex took office, namely, about the autumnal equinox, and arriving as he was at that time at his twenty-ninth year, his birthday was on or about September 22.

This quotation also states definitely that the pontifices held office and that Galen was appointed for seven months at a time and not for a year at a time as you, von Müller[6] and all other writers whom I have studied contend. For the first pontifex held office for seven months, and Galen records he was appointed by the first and second for this length of time, hence it would appear that the second pontifex also held office for only seven months. Continuing he informs us that he was appointed "in the same way" (ὡσαύτως) by the third, fourth and fifth, in other words that each appointment was for seven months. The five appointments thus cover a period of thirty-five months lasting from September 22, 158 to August 161, and not five years as is usually stated.

Writing in another place about the treatment of wounds Galen tells us (xviii$_2$, 567)[7]:

> As I have previously explained, it is necessary to keep the wound continually moist, because if the dressings dry out, the ulcer becomes inflamed. This is true especially in summer, at which time when the pontifices of Pergamum were celebrating the appointed gladiatorial games, I cured the most seriously injured by covering the wounds by a cloth wet with astringent wine kept moist both day and night by a superimposed sponge.

From this you and von Müller conclude that the gladiatorial games were held only in summer. To me it indicates that some games took place in summer, but it does not even imply they were limited to that time.[8] It was on the wounds occurring especially during the summer when they were most likely to become dry that Galen was able to show the great efficacy of his treatment.

From this quotation you also decide it was in association with these summer games that he received his first appointment, and hence he was born "at least a month earlier" than September 22. That these summer games had nothing to do with his birthday is apparent both from this and the previous quotation.

In addition, in the words of Galen himself (xviii$_1$, 401, 402) he dislocated his clavicle in his "thirty-fifth year during the scorching weather of dog days." Dog days were from about July 3rd to about August 11th. If he were born in summer he would almost surely have said just as he "was arriving at thirty-five" instead of in his thirty-fifth year.

So much for his birthday which was quite evidently about September 22d.

II. THE YEAR OF HIS BIRTH. MY REASON FOR BELIEVING 130 A. D.

Galen expressly states (xiv, 649) in an article written about thirteen years after to his friend and pupil Epigenes who knew the facts thoroughly, that he left Rome at the end of his first sojourn shortly before Lucius Verus returned from the East at the close of the Parthian War. All authorities, you included, subscribe to this and allow this Commander's return to have occurred in or about March, 166 A.D. Galen, therefore, left shortly before March, 166. This "shortly before" may, of course, mean anything from one week to three or even four months, particularly since the article in which it is recorded was written about thirteen years after.

In another work he informs us that he remained in Rome on this first sojourn three years, which brings him to the Capital "shortly before" March, 163 (xix, 15, ἔτεσι δὲ τρισὶν ἄλλοις ἐν ῥώμῃ διατρίψας in which I take ἄλλοις to mean "three other years" in addition to the years he spent in Rome from the time of his return in 169 till the time this book "De Libris Propriis" was written about 198).

In still a third work he states "after the thirty-second year I dwelt in Rome" (μετὰ το τριακοστὸν καὶ δεύτορον ἔτος ἐν ῥώμῃ διέτριψα Aldine, Vol. v, p. 272½ and Basel 1538, Vol. v, p. 585).

If he left the Capital shortly before March, 166 after remaining there about three years, he must have arrived shortly before March, 163. If he dwelt in Rome after his thirty-second year, he must have been past thirty-two on his arrival. Since we have already demonstrated that he was born in the month of September, if he were past thirty-two shortly before March, 163, he was evidently born in September, 130.

The idea that Galen remained only three years in Rome agrees also most satisfactorily with our knowledge of his activities.

III. GALEN'S ACTIVITIES IN ROME ON HIS FIRST SOJOURN ACCORDING TO MY CHRONOLOGY OF HIS BIRTH IN SEPTEMBER 130

He refers so often to the writings and other activities of his first sojourn in Rome that it is very likely none of importance is missed. In addition we have six notable events during this sojourn about which it would seem worth while trying to group them: (a) His advent to Rome shortly before March, 163. (b) The illness of his friend the philosopher Eudemus which took place the midwinter (xiv, 614) after his arrival, in other words about February 4, 164. (c) The discussion on venesection with the Erasistrateans which took place several months later, and which became so acrimonious that Galen gave up participation in medical meetings and limited himself to practice and writing (xix, 15). (d) The departure of his patron and friend the Consular Boethus to Palestine as Governor between the Autumn of 164 and the Summer of 165, apparently in the Spring of 165. (e) Galen's dislocation of his clavicle in the dog days of his thirty-fifth year (xviii$_1$, 401, 402) and therefore in July or August, 165. (f) Galen's departure from Rome shortly before March, 166.

Activities between his advent shortly before March, 163 *and the Illness of Eudemus about February* 4, 164. He arrived in Rome shortly before March, 163 with the intention of remaining only till the end of the Parthian War (xiv, 622). Since the death of the Parthian Commander, Vologeses, or special reverses, might bring this about at any time, he began at once sight-seeing, visiting the libraries and book-stores, making the round of the medical and philosophical teachers, and attending scientific discussions in the Temple of Peace. Not being his nature to sit quietly by as an auditor while others talked, he began early to participate.

He rented a house, or at least an apartment, large enough not only for his own needs, but capable of accommodating a patient or two (xi, 300; xiv, 648). This house or apartment possibly belonged to one of the officials who accompanied the Emperor Lucius Verus to the Parthian War, and expected to demand it back on his return. Intending to remain only till the end of the war, such a house would exactly meet Galen's requirements, and the necessity of giving it up may furnish an added reason for his departure shortly before the return of Verus.

His first acquaintance of note was Eudemus, a teacher of Aristotelianism, evidently interested in, and possibly a lecturer on biology, whom he adopted as preceptor. He also became acquainted early with the medical men Teuthras, a younger compatriot from Pergamum (xi, 193), and Epigenes (xiv, 606 et seq.), both of whom became enthusiastic followers.

No license being necessary he began to practice, his first patients apparently being seen in consultation with some of the younger men, like Epigenes and Teuthras, who were impressed by the anatomical discoveries which he took pride in describing, and the surgical work in the Pergamum amphitheater of which he boasted. In the light of Teuthras's great admiration, it is likely that he was responsible for spreading the knowledge of some of Galen's work.

The first patient of prominence we hear of was Eudemus, who fell ill with quartan fever just before the *middle* of the winter (xiv, 613 ἤδη που μέσου χειμῶνος; 614 ἐν μέσου χειμῶνος) following Galen's advent. Exact midwinter is February 4; the illness took place, therefore, shortly before February 4, 164.

Epigenes appears to have been the usual medical adviser of Eudemus, but when the disease became serious two consultants were called in, namely, Antigenes, a prominent Dogmatist, and Martianos (xiv, 613 et seq)., a highly esteemed anatomist and well-known Erasistratean-pneumatist. On account of Galen's friendship for his preceptor Eudemus, he visited him frequently in a social way to inquire about his health. As a consequence he became well acquainted with these two physicians, and it was about this time, or possibly shortly before that Martianos made his inquiries concerning him (xix, 13):

"Who is this man Galen?" inquired Martianos, "and to what sect does he belong?" "No sect" came the answer, "they say he calls slaves who follow any man whether he be Hippocrates, Praxagoras or any other. He claims he chooses the good wherever he finds it." "Of whom among the ancients does he talk most?" continued Martianos. A lapse in the original conceals the answer, but taking place as it did either during or shortly before the illness of Eudemus, it points to the fact that Galen had been talking freely about, or even giving lectures on the sects. A few students may have already gathered about him. It is, therefore, possible that several of his lesser works were written at this time, namely, before the illness of Eudemus, such as: Sects to Beginners, a Sketch of the Empiric Sect, Bones to Beginners, a Dictionary of Hippocratic Words and Pulse to Beginners, the last two written for Teuthras.

During the illness he became acquainted with a previous consul, a friend of Eudemus, Flavius Boethus, who like Eudemus was a follower of Aristotle and a teacher of philosophy, apparently biology, for full of enthusiasm Galen exclaims (ii, 216): "If ever there was a man inflamed with the ardor of physiological inquiry it was he." Eminently congenial to the Pergamite inflamed with similar ardor, they became intimate friends, and it is difficult to know which admired the other more. For not only did they discuss every biological problem they could conceive, but the Roman official adopted Galen as his family physician, and paid him the largest sum he apparently ever received for the treatment of a case ($1,700). And Galen on his part reciprocated by writing for him volumes comprising about two hundred thousand words on the subjects they discussed.

During the illness of Eudemus also Galen did the brilliant surgical operation he had learned in Pergamum on the slave of the Court Official, Charilampus, with a wounded tendon (xiv, 624) and shortly after treated the rhetorician Diomedes for a chronic affection (xiv, 625).

Activities and Writings after the Recovery of Eudemus and before the Discussion on Venesection which evidently took place several months later yet before September 164 because he was still only thirty-three. Immediately after the recovery of Eudemus, apparently about March 1st, Galen gave on the request of Boethus his well-known demonstrations of the recurrent laryngeal nerve and the movement of the thorax in respiration, followed by a dictation of both addresses to Boethus' stenographer, and they were published at Boethus' expense (xiv, 630).

Not long after occurred the discussions and demonstrations on Whether the Arteries contain Blood Naturally (ii, 642; iv, 728) followed by a book on this subject, though the edition we have comes from his next sojourn in Rome. Later came the discussion of the function of the ureters and Galen's eventual demonstration (ii, 30). These discussions and demonstrations have been reviewed by me at length in two articles entitled "Galen clashes with the Medical Sects at Rome"[9] and "Galen's Discovery and Promulgation of the Function of the Recurrent Laryngeal Nerve."[10]

Still later came the acrimonious discussion on venesection (xi, 187 et seq.) following which he gave up his public appearances in the physicians' assembly hall of the Temple of Peace and devoted himself to practice (xix, 15) and a certain amount of writing.

It is almost sure these activities following the illness of Eudemus consumed several months, hence the discussion on venesection probably took place not earlier than June, 164, yet not later than September, 164, since he was still thirty-three.

The following works were written shortly before or shortly after the discussion on venesection: Anatomy of the Living and Anatomy of the Dead for Boethus (ii, 217); six books on the Anatomy of Hippocrates for Boethus; and three books on the Anatomy of Erasistratus for Boethus (xix, 13).

Activities and Writings after the Discussion on Venesection, but before the Departure of Boethus to his Governorship of Palestine. Describing conditions after the acrimonious discussion on venesection with the Erasistrateans he records (xix, 15):

> I was still a young man being in my thirty-fourth year. After this I determined to teach no longer publicly, nor to give demonstrations since I was happier in devoting myself to those whom I could cure. For when I saw these rivals in our profession who call physician-only-in-name every medical man whom they envy when they hear him

praised, I wished to silence their envious tongues and even to those whom I was treating I said no more than was necessary, and no longer taught or demonstrated, but showed only by professional skill my scientific knowledge.

This makes it evident that after the discussion on venesection he gave up lecturing and attending scientific meetings in the Temple of Peace.

In addition to this reason for ceasing his public addresses and discussions, I am inclined to think he was made fearful by the warning of Eudemus (XIV, 623) that he was actually endangering his life since the sectaries were sufficiently vindictive to stop at nothing. If about this time or shortly after he also learned that his powerful friend and protector was about to be or might be appointed Governor of Palestine, and hence leave Rome, it would act as a still further reason.

His writings during this period were: Remarks against Erasistratus on Venesection dictated for Teuthras who was greatly impressed with Galen's ideas on the subject; six books on the Biological Doctrines of Hippocrates and Plato for Boethus (XIX, 15) on account of their frequent conversations on this subject; a Comprehensive Anatomy in two books, and one book on the Use of the Parts written as a parting gift just before the departure of Boethus, who requested them to remind him of their discussions.

It was apparently also during these months he treated the wife of Boethus (XIV, 641) for which he gave him four hundred gold pieces, and a little later treated the son of Boethus (XIV, 635).

These writings and other activities would point to the lapse of some months between the discussion on venesection and the departure of Boethus. Since Galen was still thirty-three at the time of the discussion, this must have occurred before September, 164, and since some months were required for the subsequent activities, Boethus' departure scarcely occurred before the following winter or spring. Travel being much less common in the winter Boethus probably left in the spring of 165, though the appointment may have been made or at least have been suggested much earlier.

Books written after Departure of Boethus to his Governorship in Palestine. Immediately after the departure of Boethus, Galen, dissatisfied with the one book which he had given him on the Use of the Parts, proceeded to re-write the subject at length and eventually sent to him in Palestine a complete work on the subject in seventeen books,—a labor of love for the patron to whom he felt so indebted. Taking pains as Galen does to tell us that Boethus was "still alive" (II, 217) we assume this to mean that Boethus wrote in thanks. On account of the length of time it would require to complete the return of letters from Rome to Palestine, it is evident Boethus left the Capital at least some months before Galen. Since Galen dislocated his clavicle in July or August, 165 (while he was thirty-four) and was forty days becoming well (XVIII₁, 401) I assume that this work was completed before that time, and hence Boethus probably left about the Spring of 165, or even the winter before.

Activities and Writings during first sojourn in Rome, but further Definition not indicated. As patients he treated the Sicilian physician (VIII, 361), the wife of Justus (XIV, 631), and the slave of Maryllus with the caries of the sternum (II, 631).

He wrote: Two books for Antisthenes, one on the Anatomy of the Veins and Arteries, the second on the Anatomy of the Nerves; Faculties of Cathartic Medicaments; Dictionary of Anatomic terms in five books; Types of Fever; Movement of Muscles; Differences of the Pulse; Diagnosis from the Pulse; and De Causis Procatarcticis for Gorgias.[11]

As can be seen the division of these activities over three years corresponds so satisfactorily with his various descriptions of his first sojourn in Rome that it is difficult to accept a sojourn of four years without decisive proof.

IV. DISCUSSION OF GALEN'S JOURNEY FROM ROME TO CASSIOPE IN CORFU SHORTLY BEFORE THE RETURN OF LUCIUS VERUS IN 166

You say that on his departure from Rome he went by way of Campania, Sicily, Brindisi, Corfu, etc., and refer to the Kuhn Edition XIV, 648 et seq. and XII, 172. I agree with you except in regard to Sicily. My idea is that leaving Rome hurriedly so as to avoid an official appointment his friends were soliciting for him, and fearing the Emperor might send officers to order his return, he went rapidly to Campania and without stopping proceeded to Brindisi. This is indicated by the fact that he was willing to take the *first* boat from Brindisi no matter whether it went to Dyrrhachium or Greece, and finding no boat going at once to either of these places, he took a boat going to Cassiope in Corfu because it was the first boat leaving Brindisi in the general direction he wished to go.

He told the servant he left behind in Rome to say that he had gone to Campania, but this was so little true that the inquiring friends suspected at once its falsity.

My translation of this part is as follows (XIV, 648, 649):

> Perceiving their undertaking [that is, the undertaking of his friends to procure him an official position] and fearing lest what they intended to do would prove a hindrance to my return to Asia, I requested them to defer action for a short time saying that I would announce when I was ready. Learning that the war was ended I set out immediately from Rome to go *as it were* into Campania. I left one servant to take care of the house, whom I enjoined to seek out a boat *leaving for Asia*, and having sold the household goods on the Bebura, he should go from the city and take ship to Sicily, and thence return into the fatherland. These things were shortly after accomplished.

By this he means that he instructed the servant to take a boat to Asia, but that there was no convenient boat going directly to Asia, and hence the servant took a boat going to Sicily whence he took another to Asia. The reason for the servant sailing directly, or practically directly to Asia was that he might take with him books, instruments and other things which Galen found inconvenient to carry on his rapid land journey.

> Having reached *Campania I proceeded thence* to Brindisi where I resolved to take the *first* ship going either to Dyrrhachium or Greece, fearing that some of my friends in power, or even the Emperor himself, learning of my departure, a fugitive as it were, might send an officer to order my return to Rome. After one day [in Brindisi] I sailed to Cassiope. In the meanwhile friends at Rome had been inquiring after me, and learning from the servant that I was going to Campania, *they suspected* though it was actually a fact [that is, it was actually a fact that he was going to Campania, though he had

no intention of remaining there, but intended going through at once to Brindisi]. Then when later they found neither me nor my servant in Rome they understood that what I had said in the beginning was true, that I did not intend to remain long in Rome, and even those who did not believe me before were persuaded.

From this I understand that Galen left Rome hurriedly shortly before Lucius Verus' return in March, 166, hastened to Campania, proceeded without stopping to Brindisi, and took the boat to Cassiope because it was the first boat leaving. Though the servant went by way of Sicily, there is no implication that Galen did so. From Cassiope he pursued the remainder of his journey leisurely, as you have pointed out from his remarks in Kuhn XII, 172. He passed over Macedonia on foot, visited Thasos and Lemnos and arrived home by way of Alexandrian Troy, I would say about two months or less after leaving Rome.

He did not, however, remain at home, but proceeded immediately to Caesarea in Palestine, probably on account of letters received from his friend the Governor Boethus. This stay in Pergamum was so short that he later omitted it from consideration. His actions at this time will be discussed on subsequent pages.

V. DISCUSSION OF GALEN'S VISIT TO PALESTINE AND CYPRUS IN 166

The first clue putting me on the track of the time of this visit as 166 was uncovered by your industry. In spite of the amount of time and effort I have spent on the life of Galen, I doubt if I would have remarked it without your aid.

You demonstrated that the last three books of the treatise on Temperaments and Faculties of Simple Medicaments were written not only after Commodus' death (December 31, 192), but several years after. You demonstrated this by the number of works written shortly before it, all of them surely written after 189 A.D. and many of them after Commodus' death. The order of these books is, according to your research, as follows:

Good and Bad Juices of Food-stuffs (VI, 749), which contains reminiscences of the famine of 188 and 189, and hence could not be finished before this time. Further, taking into consideration other circumstances which we know, namely, that Galen published no books between the accession of Commodus in 180 till this work was published after 189, it is possible that even this was not published till after Commodus' death December 31, 192.

Following this work the succession of his treatises is as follows:

Against those who write on Types and Periods; Habits, which you think (Rhein. Mus. LI, 195) was written about 193; Recognition of One's own Mental Defects; Commentaries on Hippocrates' Nature of Man and Regimen in Acute Diseases; Faculties of the Soul follow the Temperaments of the Body, which I think refers to Commodus, and if so was surely written after his death;[12] Development of the Foetus; Commentaries on Hippocrates' first book on Epidemics, second book on Epidemics and Prorrhetics; Coma according to Hippocrates; Commentaries on Hippocrates' third book on Epidemics, sixth book on Epidemics, Airs, Waters and Places, and Aliments; Lientery; Places Affected; Commentaries on Hippocrates' Book on Humors; The Art of Medicine; Synopsis of the Pulse; and eventually the last three books of the eleven book treatise on Temperaments and Faculties of Simple Medicaments.

These twenty writings between Good and Bad Juices of Foodstuffs and the last three books on Temperaments and Faculties of Simple Medicaments, some of considerable length and importance, consist of more than 600,000 words, and take up more than 4,000 pages in the Kuhn Edition. It is scarcely likely even with Galen's facility that they were written in less than four years, in other words, if written in succession from 189 onward the last could not be written till 193 or after, and if, as we agree, some of the earliest works were not written till 193, the last work could not be written much before 196.

In one of these three books on the Temperaments and Faculties of Simple Medicaments he states (XII, 227): Accepting a large amount of misy from this mine in Cyprus "I brought it with me to Pergamum and later to Rome, and have it yet though more or less than *thirty years* have elapsed." Recognizing that this book could not have been written earlier than 193, and was almost surely written several years later, it becomes evident that he must have visited Cyprus after 163.

We are positive that Galen was in Rome from shortly before March, 163 (and according to your chronology from the Spring of 162) to shortly before March, 166; we are positive also that he was again in Italy from February, 169 till about 179.[13] From works written during this second sojourn we learn that he had already visited Palestine and Cyprus (XI, 690; XII, 214, 226, 234, 238). With the facts before us that this visit was previous to 169 and recollecting his statement made about the year 196 that about thirty years have elapsed since the visit, it is evident that it must have taken place between his departure from Rome in 166 and his recall by the Emperors in the Fall of 168.

The date of the writing of the last three books of the eleven book treatise on Temperaments and Faculties of Simple Medicaments is further confirmed by the continuation of the above quotation (XII, 227): "By chance this work was completed to the eighth book *twenty years* ago." The evidence from your research (Rhein. Mus. XLVII) makes it appear that this work was completed to the eighth book about 175 or 176,[14] and therefore, completed entirely about 195 or 196.

Once you gave me this idea I was surprised and gratified how certain other events fell into place around it. For instance, I recognized that not only did he visit Cyprus at this time but also Palestine, and this visit to Palestine was almost surely on account of the presence of his friend and patron Flavius Boethus, for never could the urge to visit Palestine have been stronger. The following appear to be the circumstances:

Galen left Rome shortly before the return of Lucius Verus in March, 166, worn out by the antagonism he had encountered and ready for rest and recreation, hence his leisurely trip across Macedonia (XII, 172). I do not believe he knew of the outbreak of the Pest in Asia when he left Rome, though thirty years later he seems to imply this when he says (XIX, 15): "Having sojourned three other years in Rome, the great Pest beginning, I hastily set out from the city going eagerly to my native country"; which may be taken to mean that having learned the Pest had broken out in Asia he left Rome for the purpose of giving aid. His leisurely journey across Macedonia (XII, 172), however, is against this little boast as well as the fact that in his book to Epigenes written only thirteen years later he makes no such implication. The fact, however, of the boast that he left Rome and went to the aid of his countrymen suffering from the pest is evidence that he actually did treat the pest.

Friendly as Boethus was, it is practically sure that he dispatched letters of thanks for the huge physiological treatise (The Use of the Parts) which Galen sent to him in Palestine, and at the same time or later, letters of sympathy on account of the dislocation of the clavicle. It requires no imagination to believe that in these letters were expressed the pleasure he enjoyed in Galen's company discussing the subjects of which he was so inordinately fond, and the courteous wish that they were together again; hence it is not hard to see how Galen would be influenced toward visiting Palestine at this time.

In addition to this perfectly obvious reason for the visit, I am persuaded there was another. Knowing as we do that the pest began in central Asia, apparently in Babylon (see my article: Refutation of the charges of Cowardice made against Galen[15]), and spread over the entire empire (except Africa) in the wake of the soldiers returning from the Parthian War, and knowing that it broke out in Rome sometime between May, 166 and the following Spring, it is likely that it was ravaging Antioch and Caesarea at the time Galen reached Pergamum (I think about May, 166). What more natural then to have Galen on his arrival receive other letters of courtesy from Boethus containing also the news that the pest was disorganizing his Capital (Caesarea).

No man with whom he came in contact influenced him more than Boethus, and apparently to no one was he more devoted. On account of the protection this powerful official, even though unconsciously, afforded him in Rome, we would expect a strong desire to reciprocate. Learning at Pergamum, or even before he arrived, that his native city was not suffering at that time from the pest, he went to Caesarea with the intention of helping his friend.

We read in Galen (XIX, 16) that Boethus died while in Palestine, but whether before or after his arrival he gives no hint. Boethus may have been dead on Galen's advent, or have died (even of the pest) while he was present and even treating him.

One objection to my idea that Galen treated the pest in Caesarea is his failure to mention it. This may be answered in three ways: First, his work in Caesarea was so well known in Rome and he received so much credit for it that he deemed it unnecessary to mention. I believe, however, he does refer to it when, describing his call by the Emperors to Aquileia in the Fall of 168 on account of the breaking out of the pest among the troops, he states (XIV, 649): "When there was talk of those who proved their medicine and philosophy *not by words but by deeds* not a few of my friends mentioned me." It is quite evident if he had run away from the pest in Rome in 166, his friends would not be boasting of his qualities as a physician and philosopher in the Fall of 168, while it is equally evident if he spent some time treating the pest in Caesarea his friends had particular reason to recommend him.

Second, I have found that though Galen was willing to boast of his cures when he was able to instruct by explaining his method of treatment, I have also found him sufficiently modest that he did not go out of his way to boast of his charitable work, and if he went to Caesarea on account of the pest, this was purely for altruistic reasons, and he probably had no new or successful treatment to suggest.

Third, to the critics of Galen who do not agree with my impression of his modesty, I would be willing to allow that he might have mentioned, or even described this stay in Caesarea in one of his many lost works, for instance, the one he wrote on the pest of Thucydides (VII, 851) referred to by you in Rhein. Mus. LII. In fact this is possibly what he means when in describing his activities between his departure from Rome in 166 and his recall by the Emperors in 168 he states (XIX, 15) that certain occupations were thrust on him after his return home from Rome.

I believe, therefore, that he not only visited Palestine and Cyprus at this time, but that his primary object was to aid his friend Boethus whose Capital was in the throes of the Pest, and this accounts for the long time he remained, namely, from about June, 166 to surely after September, 167, and I think till the Spring of 168.

This work in Caesarea also helps to account for the splendid reception he was given immediately afterwards in Cyprus, when the representative of the Emperor himself accompanied him on his visit to the different mines (XIV, 7).

In your article (Aus Galens Praxis)[4] you refer to the fury of the pest in Pergamum and Smyrna, as well as throughout Asia, but since it began in Babylon or its vicinity, it is likely it reached Antioch and Caesarea definitely before Smyrna and Pergamum. Hence this would only signify to me that after Galen had treated the pest in Caesarea he was possibly given a later opportunity of treating it again on his return to Pergamum.

It is quite evident that whether he was born in 129 or 130, he might still have made this visit to Palestine and Cyprus between 166 and 168.

VI. DISCUSSION OF THE QUOTATION FROM WHICH YOU CONCLUDE THAT HIS BIRTH WAS IN 129

Referring to his settling down in definite fashion in Pergamum following his first sojourn in the Capital he tells us (XIX, 16): "I returned, therefore, from Rome to my native land thirty-seven years from my birth having been completed." On this quotation alone you base his birth in 129 A.D. We agree that he left Rome shortly before the return of Lucius Verus in March, 166, but you contend that spending a number of months on the journey he arrived in Pergamum after his birthday (which you believe was in summer) and that this birthday was his thirty-seventh. If this were true, it would, of course, mean he was born in 129.

This would, however, necessitate traveling about five months or more, though as I have shown in my discussion of his journey from Rome to Cassiope this first part was made very rapidly, and it is quite certain he did not stop at Campania or Sicily on the way. It is true that he traveled leisurely on foot across Macedonia (xii, 172), yet with the utmost leisureliness I cannot account for more than two months for the entire trip because there were no cities or places in which he was interested till he reached Lemnos and Thasos, and we have no reason to believe he spent more than three weeks at the most in both.

In addition, if this quotation is extended so as to be thoroughly understood it favors my point of view of birth in 130. The quotation comes from the book written in 198, giving a catalogue of all the works he ever wrote and shows that he is not thinking about his journey from Rome to Pergamum, but only about the works he wrote in Rome on his first sojourn and the works he found in his native city which he had written years before as a student.

Winding up the catalogue of his Roman writings he tells us (xix, 15):

> At this time at the request of Boethus I wrote six books on the Doctrines of Hippocrates and Plato, [and] another book on the Use of the Parts which was the first [on this subject]. Accepting these Boethus departed from the city before me in order to take up his governorship of Palestine where he died. Some time later I completed both of these works since after my return home occupations were thrust on me (literally hindrances happened to me) which I will mention in order (*προσγενομένων μοι κωλυμάτων μετὰ τὴν εἰς οἶκον ἐπάνοδον, ὧν ἐφεξῆς μνημονεύσω*).

I interpret this to mean that he will mention these occupations or hindrances in their proper order, that is in their proper place, since he does not refer to them further in this work, though it is possible there is a lapse in the text at this point and that they were mentioned in a lost paragraph.

> I returned, therefore, from Rome to my native land thirty-seven years from my birth having been completed and found three books written by me before I went from Pergamum to Smyrna for the sake of the physician Pelops and the Platonist Albinus.

He explains just what these books were, as well as three others which he wrote as a student in Smyrna. He then continues (xix, 17):

> *Having settled myself* [καθιδρύσας] in my native country *after the return from Rome*, I took up my accustomed habits. But *immediately* [εὐθεώς] came letters from the Emperors at Aquileia recalling me. For they determined to move against the Germans at the end of winter . . . Arriving in Aquileia I found the pest spread as never before, so that the Emperors fled to Rome with some of the soldiers.

There are in this lengthy quotation three clauses of importance relating to what he did between his arrival at home in 166 and his recall by the Emperors in 168. The first of these states: "Occupations were thrust on me after my return home which I will mention in their proper place." Unfortunately Galen never wrote the book describing these occupations, or if he did it has been lost. It is these occupations which are of interest and which I am confident were associated with the treatment of the pest. They may have been described also in a lost work he refers to (vii, 851) on the pest of Thucydides which he states resembled the pest of his time, both probably being smallpox.

Leaving aside these occupations for the time, though they occurred after his return home, he informs us in the second clause: "I returned, therefore, from Rome to my native land at the age of thirty-seven and found three books written by me many years before"; and in the third: "Having settled myself in my native land after the return from Rome I took up my accustomed habits but immediately came letters from the Emperors recalling me."

Unnecessary to say his accustomed habits were the practice of medicine, research work, writing, and attending medical meetings, yet he had time to do none worth mentioning since "immediately came letters recalling him"; in fact, he only had time to run across by accident some books which he had written as a student. We know his recall took place in the Fall of 168. If he arrived in Pergamum as you affirm in the Summer or Fall of 166, he would have had two years in which to carry out his accustomed habits and his recall would be far from "immediately." Hence his settling down in his native land must mean something else than arrival in Pergamum in 166.

To me it appears plain. Having settled down in his native land after his return from Rome, which settling down occurred in the Spring of 168 after his visit to Palestine and Cyprus, he took up his accustomed habits, but immediately, that is about six months later (in the midst of which the summer vacation intervened), he was recalled by the Emperors.

This visit to Palestine, where he apparently treated the pest, and to Cyprus, where he procured various copper and zinc salts, represents the occupations thrust on him after his return home which he will mention in their proper place because here he is speaking only of the various works he wrote and wishes nothing to intervene between them.

When he states "I returned, therefore, from Rome to my native land at the age of thirty-seven" and a little later "Having settled myself in my native land after the return from Rome," I believe the second to be practically a correction or at least a more accurate definition of the first in order to explain what he means, namely, that he took up his accustomed habits and found the mentioned books after his return from Rome that is after he had settled down in Pergamum following his return from Rome, and since this settling down occurred only subsequent to his visit to Palestine and Cyprus, this is the time he is speaking of.

In addition, I cannot understand the Emperors sending for Galen when the pest broke out in Aquileia unless he had been treating the pest in Asia, and though this treatment might have been in Pergamum, I believe on account of the éclat it brought him, that it was in Boethus' Capital. Treatment of the pest in the town in which he was living is only what would be expected of any physician, while to go out of his way to treat it in Caesarea would deserve the encomium bestowed at the time of the outbreak in Aquileia (XIV, 649): "When there was talk of those who proved their medicine and philosophy *not by words but by deeds* not a few of my friends mentioned me."

Taking these factors into consideration I feel that you have not only not proved his birth in 129, but my date of 130 is much more likely.

There is, however, another passage not mentioned by you to which attention might be called as possibly pointing to his birth in 129. I am referring to a continuation of the quotation from De Libris Propriis XIX, 15, which I have quoted in part previously, but will repeat now in its entirety.

Describing conditions after the acrimonious discussion on venesection with the Erasistrateans he informs us:

> I was still a young man being in my thirty-fourth year. After this I determined to teach no longer publicly, nor to give demonstrations, since I was happier in devoting myself to those whom I could cure. For when I saw these rivals in our profession who call physician-only-in-name every medical man whom they envy when they hear him praised, I wished to silence their envious tongues and even to those whom I was treating I said no more than was necessary, and no longer taught or demonstrated, but showed only by professional skill my scientific knowledge. Having dwelt *three other years* in Rome the Great Pest beginning I hastily set out from the city going eagerly into my native country.

Taking this quotation literally would imply that after the famous public discussion on venesection, while he was still thirty-three years old, he ceased his addresses, demonstrations and public participation in medical affairs, though he remained in Rome *three other years.*

If this is true, then he remained about four years in Rome, because he was there almost surely a year or more before this quarrel about venesection took place, as is shown in my discussion of his activities on his first sojourn. In this case he would have arrived in Rome before September, 162, and if he "dwelt in Rome after his thirty-second year" then he was born in September, 129.

This idea is, however, easily controverted. The discussion on venesection being his last public appearance it is quite evident it took place after all the demonstrations previously mentioned. These, however, took place after the illness of Eudemus, and this taking place as it did in *midwinter* (XIV, 614) in other words about February 4, 163 if he were born in 129, the last discussion could scarcely occur before June or July, 163. If now he remained three more years in Rome after this discussion, as the words "three other years" might signify, he would have remained till after Lucius Verus returned from the East in March, 166, which we know to be false.

Even if we do not take this statement of "three other years" very literally, and allow it to be only two and a half years to correspond with his departure shortly before the arrival of Lucius Verus, we would still have two and a half years of such limited activities that it is difficult to imagine Galen submitting to them.

Allowing the discussion on venesection, as in my chronology of birth in 130, to take place any time before September 22, 164 (because he states he was thirty-three when it took place), and his conversations with Boethus and his treatment of his family to continue to about March, 165, followed immediately by his writing of the seventeen books on the Use of the Parts, and in July, 165 the dislocation of the clavicle, divides up better his activities without leaving a protracted gap.

As I stated in my discussion of it on a previous page, I believe this quotation signifies three other years in addition to the years he spent in Rome from the time of his return in 169 till the time this book (De Libris Propriis) was written. There is, however, even another explanation, namely, that ἄλλοις is a slip of the transcriber for ὅλοις (entire), which would make the meaning to be "Having dwelt three *entire* years in Rome." It is quite evident if any transcriber made the first o in ὅλοις to look like an a, especially while omitting the aspirate, the next transcriber could easily think that the slip of the pen was the omission of an λ.

vii. Discussion of Galen's Statement the Consulship of Claudius Severus

According to Galen (xiv, 613) Claudius Severus, the peripatetic teacher of Marcus Aurelius, was consul at the time of Eudemus' illness which took place in midwinter following his (Galen's) advent to Rome. Since exact midwinter is February 4th, Severus was consul about this time in the year 163 according to your chronology, 164 according to mine.

Since we have no contemporary inscription or coin dating this consulship and find no mention of it in any other contemporary writer, it is evident that the time of its occurrence depends on when Galen came to Rome and in what winter Eudemus took ill. As a consequence the chronological authorities do not agree, and give us dates corresponding to their ideas of Galen's activities, for instance Tillemont,[16] Goyau[17] and Klein[18] say the consulship was in or about 163, while Clinton[19] and Friedlander[20] say it was in or about 162.

Naturally, the only authorities deserving consideration on this subject are those who like you and von Müller have made a special study of the life of Galen. Both date this consulship in 163, in spite of the fact that you believe Galen was born in 129, and von Müller believes he was born in 130. I disagree with von Müller's reason for putting Galen's birth in 130, but I also disagree with your dating of it in 129. Hence the date of this consulship is held up till the controversy on the date of Galen's birth and exactly when he came to Rome is settled.

You believe Galen was born in the summer of 129, came to Rome in the Spring of 162 (at the age of thirty-two) and the illness of Eudemus took place the following February of 163. I believe he was born in September, 130, came to Rome "shortly before March," 163 (at the age of thirty-two) and the illness of Eudemus took place the following February of 164.

We know the fact that Flavius Boethus was consul also only from Galen, but since he associates this consulship with no other contemporaneous event, nobody has made the attempt even to guess at the time.

viii. My Chronology of Galen's Life

130. Born about September 22d.

144. Entered on study of philosophy at the beginning of the school year, probably in September (v, 41). On account of delicate health he had taken the previous elementary studies under his father.

147. Entered on study of medicine in September, and overworked almost every year (vi, 309, 755).

148. During dog days (about July 3 to August 11) he had an acute fever (vi, 756) which he calls tertian (vii, 638), for which he was bled.

149. Was well the entire year on account of father's insistence

that he take better care of himself.

150. Father died between September 149 and July 150 (vi, 756) apparently in winter.

During "dog days" he had a repetition of his tertian fever for which he was bled again.

151. Finished the usual four years of medical study in Pergamum probably about June. Was ill again during the summer. Shortly after went to Smyrna (ii, 217; v, 112; xix, 16), where he remained till the end of the school year. He became interested in the movement of the thorax in respiration and wrote his first article on it.

152. Went to Corinth, presumably about the beginning of the school year in September to study under Numesianus, and found he had gone to Alexandria whence Galen followed him (ii, 217; vii, 635; x, 53 et seq.; xvii$_1$, 806). He arrived in Alexandria in October, or as he says at the beginning of φθινόπωρον (vii, 635). He remained in Alexandria till shortly after September, 157. Here he wrote or sketched in outline his important philosophical work on Demonstration.[21] He was ill four of the five summers spent in Alexandria (vi, 756).

157. Returned home after September, possibly due to the death of his mother, and the necessity of looking after his estate. He began his experiments on the treatment of wounded tendons.

158. During "dog days" he became ill with what he describes as a right subdiaphragmatic abscess (v, 757). This became well after bleeding as indicated by two dreams (xi, 314) which he believed were sent by Aesculapius probably in the Temple of Aesculapius. Possibly it was while he was ill that he became well acquainted with the Priest who had charge of, or who was friendly with the one who had charge of the Gladiatorial Games.

About September 22d he was appointed by the pontifex physician to the gladiators. He considered this appointment entirely due to surgical merit, but it may have been influenced by his ardent pagan piety. He retained this position thirty-five months, in other words, till August, 161 (xiii, 599, 600).

During this thirty-five months he made his great discoveries of the recurrent laryngeal nerve and the movement of the thoracic muscles in respiration. This experimental physiological work was probably done in the operating room connected with the amphitheater.

161. January 1. Marcus Aurelius and Lucius Verus consuls.

March 7. Death of Antoninus Pius and accession of Marcus Aurelius and Lucius Verus.

April or May, or a little later, beginning of the Parthian War.

August, end of Galen's gladiatorial position. On account of the seriousness of the Parthian War it is likely there were no great games till after its termination in the Fall of 165, because the gladiators were probably impressed into military service.

162. January 1, Junius Rusticus and Aquilinus consuls.

Fall or Winter. Galen left Pergamum (xi, 299; xiv, 648), and proceeding by way of Alexandrian Troy, Lemnos, Thessalonica and Greece arrived in Rome shortly before March, 163, though this shortly before may mean any time from one week to three or even four months. He came to Rome at the age of thirty-two (xviii$_1$, 347), remained three years (xix, 15), and left shortly before Lucius Verus returned (xiv, 649) which was in March, 166.

163. January 1. Lucius Aelianus and Pastor consuls.

164. January 1. Macrinus and Celsus consuls.

Galen's friend Eudemus ill with triple quartan fever which reached its acme at "midwinter" (xiv, 613, 614), therefore, about February 4, 164. He was visited by his friends Flavius Boethus, Claudius Severus (who was consul at this time), Sergius Paulus and others to whom Galen was introduced and who enthusiastically persuaded him to give a demonstration of his discoveries of the recurrent laryngeal nerve and the movement of the thoracic muscles in respiration. This demonstration took place after Eudemus' recovery and therefore late in February or in the month of March, 164.

Just before this demonstration Antigenes and Martianos snub Galen on account of his actions in connection with the treatment of Eudemus. This was the practical beginning of the enmity of the Roman physicians.

Later in the year Galen demonstrates that the arteries contain blood naturally, demonstrates the function of the ureters, and has a protracted acrimonious discussion with the Erasistrateans in regard to venesection. The last took place before September.

165. Boethus appointed Governor of Palestine and leaves Rome.

July or August, Galen dislocates his clavicle (xviii$_1$, 401).

166. Shortly before March Galen leaves Rome (xiv, 648, 649). This "shortly before" might mean any time from one week to three or four months. He proceeded by way of Brindisi, Cassiope, Macedonia, Lemnos and Thasos to Pergamum. Hearing that the pest was ravaging Palestine, or receiving an invitation from Boethus to visit him, Galen departed at once for Caesarea. Many years later when describing his work in Pergamum after his return from Rome, he omits this short stay in his native city and states that on settling down in Pergamum after his return from Rome at the age of thirty-seven, he took up his accustomed habits, though this was the age he had reached when he arrived in Pergamum after visiting Palestine and Cyprus.

March. Lucius Verus and his army return to Rome.

April or May. Triumph of Marcus and Lucius.

Later in year, probably during the Fall or Winter, the pest broke out in Rome. It lasted from 166 to 170 and broke out again in 188 and lasted till 192. Galen describes some cases he saw in Rome in 169 or 170 after his recall from Pergamum by the Emperors.[22]

167. Early in year, uprising of Marcomanni and other tribes, the Roman General Victorinus defeated and 20,000 slain.

Spring. Marcus Aurelius and Lucius Verus set out for the North. Towards end of year Marcus returns from Pannonia to Rome.[23]

168. January. Marcus Aurelius returns to Pannonia. Probably about Spring Galen returns to Pergamum from Cyprus.

During the Fall when the troops were returning to winter quarters at Aquileia the Pest broke out with renewed violence and Galen was sent for.

169. January. The Emperors with Galen and a part of the army leave Aquileia for Rome.

February. Lucius Verus dies at Altinum.

Galen appointed physician to Commodus.

Galen's friend Sergius Paulus Prefect of Rome which position he apparently held till the death of Marcus Aurelius in 180, because Galen states in his Anatomicae Administrationes (II, 218) finished about 177 that he is still Prefect.

Sextus, son of Marcus Aurelius, successfully treated by Galen.

Death of Annius Verus, son of Marcus Aurelius, apparently the one Galen calls Sextus, while Galen is away from the Capital and its vicinity probably with Commodus.

Marcomanni and Quadi renew hostilities and Marcus Aurelius returns to the North leaving Commodus in Galen's care.

Galen remains with Commodus at Lorium and in other Imperial country houses at Lanuvium, Naples and elsewhere till May 19, 175, when Commodus is removed from his care to accompany his father to the East on account of the rebellion of Avidius Cassius.

During these years (169–175) Galen does a small amount of consulting practice in Ostia and vicinity, and an immense amount of dissecting and writing. From this time come a large number of works on the Elements, Temperaments, Natural Faculties, Use of the Parts, Respiration, Pulse, Disease, Symptoms and Therapeutics.

176. Galen wrote the first eight books on Temperaments and Faculties of Simple Medicaments.

June. Marcus Aurelius and Commodus return from the East to Rome.

Galen treats the Emperor for indigestion.

Galen moves from Lorium to the Capital and remains there till after the Emperor and Commodus go to the North in 178, writing and giving public lectures on hygiene, anatomy and physiology.

178. August. Marcus Aurelius and Commodus go to the North and remain there till after the

Emperor's death on March 17, 180.

179. Galen finds conditions in Rome so agreeable under the direct protection of the Emperor that he determines to settle there. After writing the work on Prognosis for Epigenes he goes to Pergamum (stopping at Athens on the way) and returns bringing his library with him. It is probable that at this time he sold out his estate in his native city for the only place we hear of him thereafter is in the Capital.

180. Commodus becomes Emperor.

191. During winter (of 191–192) Temple of Peace destroyed by fire.

192. December 31st, Commodus is assassinated.

193. January 1st, Pertinax becomes Emperor.

Galen gives the address he mentions in the catalogue of his works (XIX, 46), which I believe was "Exhortation to the Study of the Arts."[24]

March 28, Pertinax is assassinated and Didius Julianus becomes Emperor.

June 1st, Didius Julianus is executed and Septimius Severus becomes Emperor.

196. Galen writes the last three books of the eleven book treatise on Temperaments and Faculties of Simple Medicaments.

197. He finishes up his work "Method of Cure."

198. He compiles a Catalogue of his writings and gives us the medical treatise on Antidotes. From this year also appears to come the last work from his pen,—the philosophical dissertation entitled "Introduction to Dialectics." His death is put by Suidas in the year 200.

These, my dear Professor, are my conclusions after looking up again my references. It would be a pleasure to hear from you regarding them. I intend, of course, to write an article on this subject either in support of your statements, or endeavoring to refute them. The former would be actually the more agreeable.

Respectfully and cordially yours,
JOSEPH WALSH

To Herr Prof. Dr. Johannes Ilberg,
Arndtstrasse 53,
Leipsic S 3, Germany.

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4. His two great studies on Galen are: Ueber die Schriftstellerei der Klaudios Galenos (*Rheinisch. Museum f. Philol.*, 44: 207, 1889; 47: 489, 1892; 51: 165, 1896; 52: 591, 1897), and Aus Galens Praxis (*Neue Jahrb. f. d. Klass. Altertum Geschichte u. Deutsche Lit.*, Leipsci, Teubner, Bd. 15: 276–312, 1905.
5. The italics in all the quotations from Galen are mine.
6. VON MÜLLER, IWANUS. Ueber Galens Werk vom Wissenschaftlichen Beweis. *Abhandl. d. K. bayer Akademie der Wiss.*, i Cl., xx Bd., ii Abth., München, 1895, p. 412. He is the author most frequently mentioned by Ilberg. His other writings relating to Galen are principally critical dissertations on particular treatises and the perfecting

of the Greek text of others. These were written earlier than the first and before he acquired the "von."

7. The figures in parentheses refer to the volume and page of the Kuhn Edition, Galeni Opera Omnia, Leipsic, 1821.
8. In Rome the games were most commonly associated with a military triumph on the return of a conquering commander. Since the commander rarely returned in midwinter, these games were most common in the three other seasons. Lucius Verus, for instance, returned in March 166, and the triumph was celebrated in that or the following month. Games also were given, however, by the new consuls who entered office January 1st. And from the study of his life I would conclude that the Emperor Commodus continued them throughout most of the year.
9. WALSH, J. *Medical Life*, 35: 408–443, 1928.
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11. As Ilberg would know, and as the casual reader might not, this is the time and practically the consecutive order in which Ilberg himself determined these works were written, in fact, throughout this article I have followed him as the ultimate authority in this regard.
12. I am writing an article on this subject at the present time.
13. WALSH, J. Galen's second sojourn in Italy and his treatment of the family of Marcus Aurelius. *Medical Life*, 37: 473–505, 1930.
14. I have also demonstrated this date in an article to be published shortly entitled "Galen's Writings, their Chronological Succession and Influences Stimulating Them."
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RAYMOND VIEUSSENS AND HIS TREATISE ON THE HEART

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TIME has not dealt altogether kindly with Raymond Vieussens. During his life-time he was regarded as one of the world's greatest anatomists and one of France's most brilliant representatives in the domain of science. The medical student of a generation ago recalls the artery, the loop, the ring and the valve of Vieussens, but since the B.N.A. has completed its conquest of anatomical nomenclature, his name is probably quite unknown to the average medical student of today. Du Pont, who composed an ode in his honor, affirmed that "Europe preserved his name famous in her annals, and that posterity will remember it for all time," yet Senac a half century later describes him as an "earnest student of anatomy, a mediocre physician and a poor physiologist."

Yet Vieussens should be judged by the measuring rod of his time. Senac in his "Traité de la structure du coeur" praises Vieussens in many passages and remarks that in his work on the heart, "he assured himself by new researches, the glory which had been refused him." Vieussens' treatise on the heart, in spite of certain errors, was a notable book, noteworthy because it contains a remarkable account of a case of mitral stenosis with a beautiful plate of the characteristic pathological findings and also a clear account of the pulse in aortic insufficiency, written more than a century before the classic description of Corrigan.

Raymond Vieussens was born in the small village of Vieussens in Rovergue in 1641, the son of a lieutenant-colonel. We know little regarding the details of his early life save that he graduated at Montpellier and at the age of thirty became physician to the Hospital of St. Eloys. In 1671 he began the study of the anatomy of the nervous system with the purpose, he states,

> . . . not only to improve, as much as I could the beautiful Treatise on the Brain and the Spinal Cord of the celebrated Willis, but in addition to describe exactly all the nerves of the extremities, the description of which he dared not undertake, saying that it was a work of an infinitely great and infinitely tedious labor. . . . I undertook indeed to describe the nerves of the skin although M. Diemerbroeck had regarded their description as impossible.

Vieussens began this task with enthusiasm and tells us that during the first ten years of his service at the Hospital of St. Eloys he sectioned five hundred human bodies in attempting to find the cause of death and that he used the same cadavers, "not only to discover the normal structure of the brain and of the spinal cord, but also to follow the nerves from their origins to their insertions." In 1684 the results of his dissections were published in his "Neurographia universalis." This work met with a great reception and Vieussens became at once a celebrity, a scientist with a reputation throughout Europe. Soon afterwards he was elected a member of the Academy of Sciences in Paris and the work was received with such enthusiasm in England that he was immediately made a Fellow of the Royal Society in London. The King of Spain was much interested in this work and his physician, de Michelet, wrote Vieussens that his Catholic Majesty had read the entire work during his trip from Montpellier to Madrid and remarked that nothing was more laudable than Vieussens' application and labors for the public good.

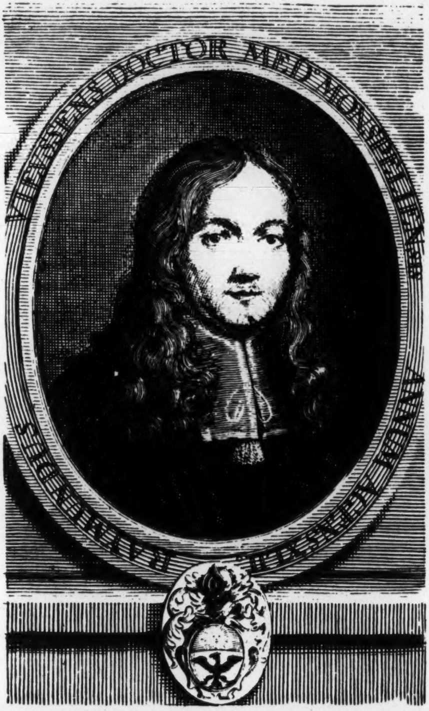


FIG. 1. RAYMOND VIEUSSENS IN 1684. FRONTISPIECE TO HIS "NEUROGRAPHIA UNIVERSALIS."

Vieussens' "Neurographia" gave the most complete description of the brain and spinal cord that had appeared up to that time. Vieussens pointed out that the spinal cord was not simply a prolongation of the brain but an independent structure showing enlargements where nerves emerged at various places. In this work he described the centrum ovale, the ansa subclavia, the loop of Vieussens and noted for the first time the pyramids and olivary bodies. Senac, in referring to his "Neurographia," remarked that "the name of this Anatomist would have passed to posterity without a stain if he had confined himself to this work." But Vieussens was too elated with his success and also too industrious by nature to cease his labors after the publication of his first success. He had sent a copy of his work to M. Fagon, the first physician to the King and another to Richard Lower in London and both of these worthies sent him letters of thanks and praise. "These small suc-

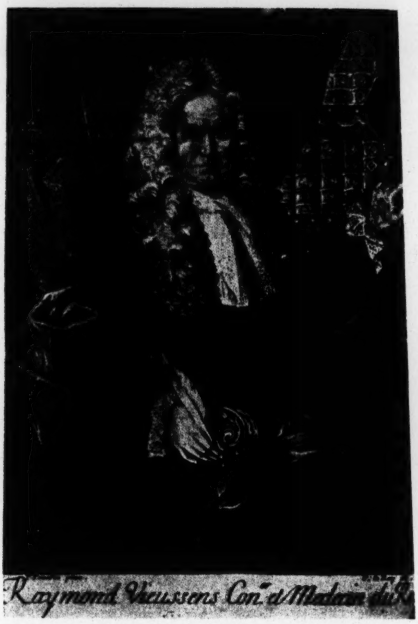

Raymond Vieussens Con.er et Medecin du R

FIG. 2. RAYMOND VIEUSSENS IN 1715. FRONTISPIECE TO "OEUVRES FRANCOISES DE M. VIEUSSENS' TOULOUSE, 1715. (KINDNESS OF SURGEON GENERAL'S LIBRARY.)

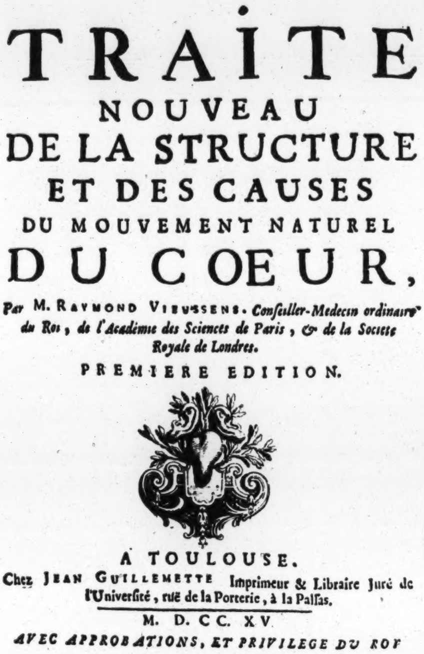
cesses," he wrote, "gave me new reasons for continuing my studies."

Vieussens was called to Paris in 1688 to attend the Marquis de Wardes and was granted a pension of one thousand pounds a year, by Louis XIV. "His Majesty ordered me," Vieussens said, "when I had the honor of thanking him for this great favor, to continue to work, as much as I could and make new discoveries in the human Body." Vieussens began the study of the lymphatics and blood vessels of the body, and worked long upon this problem. Shortly after his arrival in Paris, Mme. de Montpensier, the cousin of Louis XIV, appointed Vieussens her physician, a position he held until her death in 1693. He then returned to Montpellier and the results of his studies on the lymphatics and blood vessels were published in his "Novum Vasorum Corporis Humani Systema," which was printed at Amsterdam in 1705. This work, although extravagantly praised at the time, has added nothing to its author's reputation as an anatomist. It contains, however, the record of several very interesting autopsies.

Vieussens' first book shows a certain fondness for speculation and his "Traité des Principes éloignez & prochains du mixte," gave him every opportunity to indulge in this pastime. In this book he attempts to explain the chemistry of the human body, a task which he felt was aided by his knowledge of fermentations. This treatise contains material of antiquarian value only, but is of interest as the starting point of some of Vieussens later vagaries. Not content with being a great anatomist, Vieussens wished also to be known as a great chemist, and his excursion into this new field led to a very interesting and amusing event. He believed that he had distilled an acid from a mixture of blood and clay and was convinced that the discovery of this acid was going to revolutionize medicine. He obtained permission to demonstrate publicly his new discovery at Montpellier and appeared in the great amphitheater of the faculty of medicine before the professors and the students. Hardly had he commenced his address before the large assembly when one of the professors, Chirac, arose and claimed the discovery as his. A tumult arose, the meeting was adjourned and a violent dispute was carried on for some time. Astruc was finally induced to act as arbiter. He decided that it was absurd to quarrel about an imaginary substance and that the acid obtained by distillation did not come from the blood but from the substances added to it. So the verdict was in favor of neither Vieussens nor Chirac.

Vieussens' investigations upon the blood were embodied in his "Nouveau Système des Liqueurs du Corps humain." Upon finishing this book he tells us he "recognized the impossibility of discovering and explaining clearly the primary natural moving principle of these liquids without having given also a clear idea of the true structure of the Heart." This led Vieussens to a careful study of the heart and the results of his industry appeared in his "Traité Nouveau de la Structure et des Causes du Mouvement Naturel du Coeur," published at Toulouse in 1715, the year of his death at the age of seventy-four. (Fig. 3.)

Vieussens' treatise on the heart is in many respects the most interesting of all his writings. True to form he indulges in certain speculations, some of which are obviously wrong while others have a curiously modern ring and seem quite in line with the teachings of our modern cardiologists who study their patients with stethoscopes, electrocardiographs and x-rays, none of which our Montpellier physician had at his command. The book is an attempt to explain the structure and movements of the heart and the author describes many cases of heart disease to aid in his explanations. Many of these patients are described with such vividness and accuracy that one is led to dissent from Senac's statement that Vieussens was "a mediocre physician" but rather link his name with that of Heberden, Fothergill, and Sydenham and others noted for their portrayal of disease pictures. We are tempted also to disagree again with Sachs' statement that the illustrations in this book are "neither instructive nor exact," in support of which dissent four illustrations are presented.



TRAİTE
NOUVEAU
DE LA STRUCTURE
ET DES CAUSES
DU MOUVEMENT NATUREL
DU COEUR,
Par M. RAYMOND VIEUSSENS. *Conſeiller-Medecin ordinaire du Roi, de l'Académie des Sciences de Paris, & de la Societe Royale de Londres.*
PREMIERE EDITION.

A TOULOUSE.
Chez JEAN GUILLEMETTE Imprimeur & Libraire Juré de l'Univerſité, ruë de la Porterie, à la Palſas.
M. D. CC. XV
AVEC APPROBATIONS, ET PRIVILEGE DU ROY

FIG. 3. TITLE PAGE OF VIEUSSENS' "TRAITE NOUVEAU."

Vieussens' treatise begins with a discussion of the pericardium. He describes quite vividly the clinical course of several patients who had died of pericarditis with effusion and of adhesive pericarditis and details for us the autopsy findings. His description of the coronary arteries and veins is very clear and illustrated by very good pictures although he imagined that the muscular fibers of the heart were prolongations of the coronary arteries. These fibers he called "conduits charnus" and he believed they ran into the ends of the veins. Yet he gave and illustrated remarkably well the course of the muscular fibers of the heart. Garrison notes that "Vieussens first correctly described the structure of the left ventricle, the course of the coronary vessels, the valve in the large coronary vein" (Figs. 4 and 5). But the high point in his treatise is reached in Chapter XVI, which describes the structure of the internal surface of the left ventricle. Here we find a description of a patient suffering from mitral stenosis and another patient ill with aortic insufficiency, both with autopsies. Even the names of the two unfortunate patients are preserved for posterity.

The first of these patients was the "sieur Thomas d'Assis, Apothecary, native of the region of Florensac in Gascony, Diocese of Auch, aged thirty years or thereabouts." D'Assis came to Montpellier in November, 1705, and being without funds was taken to the St. Eloys Hospital. Vieussens was called to see him and wrote:

> I examined his state; he was lying in his bed, his head high; his respiration

seemed to me very difficult; his Heart was laboring under a very violent palpitation; his pulse appeared very small, feeble, and quite irregular; his lips were the color of lead, and his eyes downcast; his legs and his thighs were swollen, and rather cold than warm.

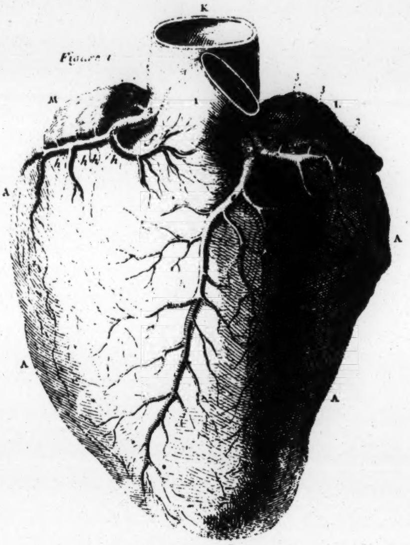


FIG. 4. ANTERIOR VIEW OF THE HEART SHOWING THE CORONARY VESSELS.

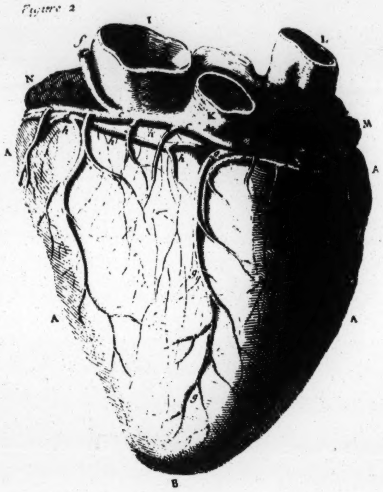


FIG. 5. POSTERIOR VIEW OF THE HEART SHOWING THE CORONARY VESSELS.

The patient died one week later and Vieussens performed the autopsy. He found the heart to be markedly enlarged, the coronary veins dilated and "the cavity of the right ventricle and right auricle had become excessively large." He proceeded carefully and:

> . . . in examining the extraordinary dilatation of the trunk of the pulmonary vein, and of its common openings, I perceived that the opening of the left ventricle appeared very small, and that it was of an oblong oval shape; and in seeking the cause of such a surprising fact, I discovered that the mitral valves of this ventricle were really bony, and I understood that as they were hardened they became thickened and shrivelled enough to produce a marked narrowing of the lumen, and I give a picture of it such as is shown in the plate below. [Figs. 6 and 7.]

This description of the pathological findings in the accompanying plate leaves no doubt in our minds that the diagnosis was mitral stenosis. The description of the blue lips of the patient is striking and also the small feeble pulse whose utter irregularity (*tout-à-fait inégal*) suggest an auricular fibrillation.

Vieussens' epicrisis is very interesting:

> The lumen of the left ventricle being so much stenosed and its margin having lost all its natural suppleness, the blood could no longer enter as freely and abundantly as it should have, into the cavity of the ventricle: in the beginning the circulation was embarrassed, the pulmonary vein began to dilate . . . the branches of the pulmonary artery and vein . . . were too full of blood and consequently so dilated that they compressed the vesicles and prevented the

> air from entering freely and leaving freely; that is why the patient always breathed with difficulty . . . The smallness, feebleness and inequality of his pulse came from the very small quantity of blood which the left ventricle furnished to the aorta; from the weak force with which it was pushed into the lumen of this artery and from the irregularity of the contractions.

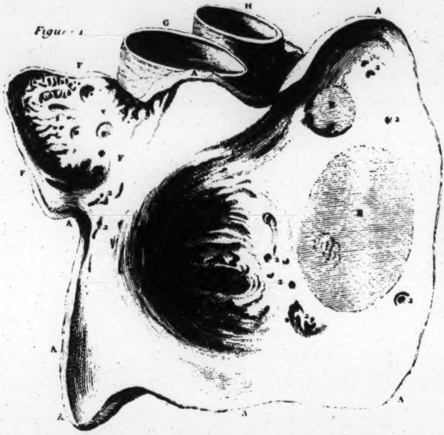


FIG. 6. THE HEART OF THOMAS DASSIS. "D.D. THE MOUTH OF THE LEFT VENTRICLE, STENOSED ENOUGH BY THE MITRAL VALVES CHANGED INTO A STONY SUBSTANCE, AS TO ALLOW PASSAGE ONLY WITH DIFFICULTY AND IN SMALL AMOUNTS, THE BLOOD FROM THE PULMONARY VEIN INTO THE LEFT VENTRICLE."

These reflections of Vieussens seem quite sound and in accord with the teachings of a much later epoch.

Vieussens' second patient was one Jean Chifort, "native of Mauguyo en Languedoc, Diocese of Montpellier, aged thirty years or thereabouts." He was an epileptic who was brought into the St. Eloys Hospital during an attack, and Vieussens examined him "in making my rounds, following my custom, to the sick of this Hospital."

> After having noted the depression of his eyes, the puffiness and the pallor of his face, I examined his pulse which appeared to me very full, very rapid, hard, irregular and so strong that the artery of first one and then the other arm struck the tip of my fingers as much as a cord would have done which was tightly stretched and violently shaken [autant que l'auroit fait une corde fort tenduë & violemment ébranlée]. The pulse of this patient, the like of which I have never seen nor hope to see, convinced me that he was suffering from a violent palpitation of the Heart. I was not deceived in it; for having questioned him upon this fact, he told me that for a long time he had not been able to rest comfortably on either side, nor indeed on the back, if his head were not very high, because the marked beating of his Heart prevented it; and he added that when he lay on one side or the other, and particularly on the left, it seemed to him that someone was striking him on the ribs with a hammer.

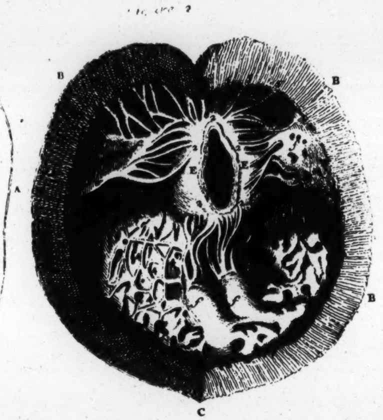


FIG. 7. THE HEART OF THOMAS DASSIS: "E.E. THE MITRAL VALVES CHANGED INTO AN OSSEOUS SUBSTANCE."

The patient died three days later and Vieussens found at autopsy that:

> The left ventricle was extraordinarily dilated; the walls of the arch of the aorta appeared to me very thick, very hard and cartilaginous-like; the semilunar valves were stretched and cut off at their tip: all of these cuts which had

some resemblance to the teeth of a saw, were truly osseous.

Unfortunately these findings are not illustrated in his book. In discussing the case Vieussens adds:

> The left ventricle could not push into the aorta the blood it should furnish it except by very violent contractions; and as the valves were cut off, their ends could not approach each other close enough so as not to allow any opening between them; that is why every time the aorta contracted, it sent back into the left ventricle a part of the blood which it had just received. It was then the disturbance in the direction of the blood, caused by the rigidity and the stony notches of the aortic valves, which caused the palpitation of the Heart and the beating of this artery which occurred in very strong impulses.

The clinician recognizes the picture at once. The pallid cardiac patient, with a violently beating heart; the throbbing pulse like a tightly stretched cord which is shaken. Vieussens' figure of speech in describing the pulse is quite as good as Corrigan's term "visible pulsation." The pathologist in reading Vieussens' description of the autopsy feels reasonably certain that this young man of thirty with a thickened scarred aorta and aortic valve "cut off" was suffering from a syphilitic aortitis with an aortic insufficiency. He may also reflect that Vieussens' explanation of the mechanism of the production of the collapsing pulse is quite as good as the explanation of his successors in the study of cardiac disease.

Vieussens apparently was the first observer to note the throbbing pulse in aortic insufficiency although Cowper in 1705 preceded him in a description of the characteristic valvular lesions, and in illustrating them. Cowper also mentions an autopsy in which he "found divers Petrifications in the Mitral and Semilunary Valves of the Left Ventricle of the Heart."

Vieussens impresses us above all with his industry and his intense interest in the study of disease. He seems to have been an earnest and sincere student of disease, and to have practiced what he preached, that a physician . . .

> . . . risks his salvation and his reputation at all times, if he does not work as much as his strength permits him, to put himself in the position of filling with dignity all the duties of his Profession [and] finally not through ignorance to destroy the lives of patients, who because of their confidence in his ability, without being acquainted with it, give themselves into his care.

Astruc judged Vieussens as follows:

> He was desirous of glory and very industrious. He would have gone far if he had had the spirit, and above all, if he had the critical judgment to discriminate between the good, the true, the substantial and the bad, the mediocre and the false. His style was very prolix and his Latin full of Gallicisms, but it was clear and one reads it without difficulty. In spite of these defects, which diminish his worth, I do not believe that one could fail, without doing him injustice, to place the name of Vieussens among the number of illustrious physicians whom the Faculty of Montpellier has produced.

The verdict of Astruc seems just. Much of what he wrote was inconsequential and trivial. But in it all we recognize those qualities which have inspired all great searchers after truth, honesty of purpose and a compelling curiosity which led to a constant prying into the secrets of Nature. The divine spark of genius rarely glowed in Vieussens but it was surely hovering near when he described mitral stenosis and aortic insufficiency.

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LEONARDO DA VINCI AS A PHYSIOLOGIST*

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THE smile of the *Mona Lisa* has through the ages defied analysis. Something more than the form and beauty of the face in this portrait fascinates. What lies behind those eyes? What does that smile mean? And why do such questions disturb us when we accept other portraits, equally well executed perhaps, without being driven to analyze their significance. Assuredly, Leonardo da Vinci has a deeper interest than recording a mocking smile as he paints this portrait. Seemingly he searches the meaning of life, of truth, and of beauty. The answer is not found. The smile remains an eternal enigma and a record of one who tried to understand "why."

Two of Leonardo's other paintings, *The Last Supper* and the less-known *Battle of Anghiari*, faded because their creator experimented in new methods of mural painting. If we thumb even sketchily through his notebooks,[1] crammed as they are with hydraulics, military engineering, lyrics, geology, flying machines, astronomy, anatomical sketches, botany, mathematical equations, and mechanical devices, we realize how thoroughly he is preoccupied in what lies beyond and behind form, that is, in function. Form becomes almost a mere handmaiden, a strange possibility in an artistic mind, and one of the many proofs of the versatility and catholicity of this oft-called Apelles of the Renaissance.

Coolly observing everything, he constantly asks why and how. True enough, that he often does fall back on a "this-thing-was-ordained-by-Nature-in-order-that"[2]* (QII, 17r) premise to explain his observations but more often does he seem to do this when he can analyze no further. It is assuredly a modern spirit of learning by experimentation which constantly dominates his thinking. A strict teleology was inherited from Aristotle and Galen by the savants of the Renaissance and was accepted by Leonardo, as evidenced by the following quotations from his manuscripts.

> Nature, it is said, always produces its effects in the easiest way and in the shortest time possible. [QI, 4r]
>
> Nothing is superfluous and no thing is wanting in any species of animal. [QI, 4v and QII, 3r]

With such attitudes it was barely possible to dissociate form and function, as McMurrich has pointed out.[3] But a hasty perusal of the "Quaderni Anatomia,"[2] the scattered pages of his work which contain most of the anatomical drawings and notes, reveals strikingly how much of that work was motivated by a curiosity as to how and why a particular part functioned.

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* See Bibliography[2] for explanations of all similar references.

*The appearance of McMurrich's[3] exhaustive study of Leonardo da Vinci as an anatomist will undoubtedly stimulate many new studies. His splendid analyses of pre-existing and contemporary knowledge and his complete survey of all Leonardo's anatomical concepts at last makes possible a critical evaluation of Leonardo's work. The present paper, however, is not a critique, but aims merely to present a summary of Leonardo's physiological ideas. As far as I am aware these have not been gathered together except in an obscure medical thesis of Verdier[4] and Hemmeter's rather unsatisfactory chapter in his "Master Minds in Medicine."

It does seem of interest, then, to attempt some separation of Leonardo's physiological ideas from his anatomical descriptions and, whenever possible, to indicate any specifically new contributions he made. The total of the latter is not large and it is not by them that we shall judge the stature of his physiology. His fundamental attitudes are so strictly modern that, had his works been available to his contemporaries and immediate successors instead of being buried for 300 years, one cannot but wonder if the scientific era with experimentation as its lode-star would not have come before the 17th century and Bacon. Assuredly, this statement is Baconian:

> Desiring not, nor being able to refer to the books of the ancients I shall refer to that which is more truthful than books, to experience, the instructor of instructors.

It is this approach to a new idea which is the most interesting part of a study of this man and his work.

In general, Leonardo's physiology is that of his day, the accepted Galenic tradition as handed down from the second century through the Arabian school. The dominant characteristic of living things was a vital force, a "pneuma" or "anima." According to the Greeks it was derived from the air in respiration, elaborated by the innate heat found in the left heart, and carried throughout the body. Galen had classified three types of pneuma: (1) psychic, transported from the brain by the nerves, (2) animal, derived from the liver and distributed by the veins, and (3) spiritual, coming from the left side of the heart and carried by the arteries. This tradition taught further that food, after a conversion or concoction into chyle in the stomach went to the liver, the manufacturing plant of the humors (blood, yellow bile, black bile, and water). Water left the body through the kidneys. A portion of the blood was converted by the innate heat of the heart into anima, passed through the ventricular septum, and was carried by the arteries. Wastage and restoration of body parts were continuous processes. Restoration was accomplished by the blood.

To disagree with the authority of the ancients was heresy in any field. Scientists of the day went so far as to say that if body parts were not as Galen had described them the race must have changed in the interim of 1300 years. But Leonardo is constantly inquiring deeper into these accepted physiological processes, ignoring the bulk of scholastic theories about anima, or pneuma, or humor, and questioning or disagreeing with authority in a refreshing manner. A common analogy he draws is man, the microcosm, resembling the world, the macrocosm, but, for the most part we find him content to observe the functioning of a part, and, whenever possible, to explain his observation in a thoroughly scientific way on some mechanical-mathematical basis.

In the skeletal system Leonardo's anatomical additions reach, perhaps, their greatest fruition. Before his time all representation of the skeleton was most primitive, incorrect, and so largely conventionalized that any semblance of reality was lost and adequate understanding of the mechanics of movements not possible. By properly representing for the first time the first and second curvatures of the spine, by analyzing the angle of the sacrum and the correct position of the pelvis (which allow proper distribution of the weight on the lower limbs) he correlates functional posture and structural skeleton (AnA, 8v and 13).[4] He recognizes that the curvature and inclination of the ribs are essential to the mechanics of respiration. The maxillary antrum, well described for the first time, contains a humor which nourishes the roots of the teeth (AnB, 40). In many places we find that his exact mechanical knowledge and interest lead him to other new observations in the mechanics of the skeletal system, as, for example, the restricting effect of the flexion of the forearm on the rotation of the radius (QIV, 14r). Histological structure or function, was, of course, not known to Leonardo though it is interesting to speculate what he would not have observed had he been able to have van Leeuwenhoek's microscopes of 150 years later. He plans to saw through each individual bone of the body. He notes that the internal marrow is of spongy substance, blood, and fat, with influx of hard bone, which is devoid of feeling. Cartilage is different, being pliable, unbreakable, and acting "in the fashion of a spring" (QII, 18v). McMurrich has an interesting passage quoted in part from Leonardo:

> In children the position of the joints is indicated by constrictions, whereas in adults the joints are prominent and explains this by the flesh covering the bones losing its "superfluity of fullness" as age advances, the skin thereby coming nearer to the bones; but at the joints there is no flesh, but only cartilage and tendons, so there is nothing to grow leaner.

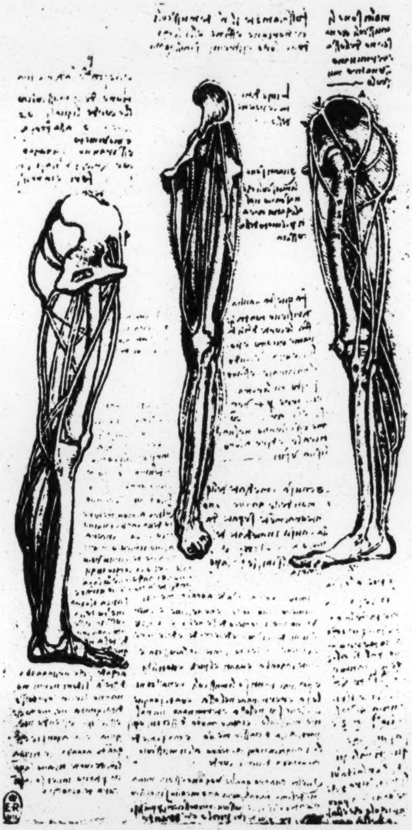


FIG. 1. LEONARDO'S DIAGRAMS GIVING HIS METHOD OF ILLUSTRATING ACTION OF VARIOUS MUSCLES OF THE LOWER EXTREMITY. THE MUSCLES ARE REPRESENTED AS WIRES OR CORDS. (QV, 4R.)

Quite naturally the muscular system in particular appeals to da Vinci, for here are demonstrated many mechanical principles as well as the secret of surface modeling of the body so necessary to his artistic creations. He draws models of copper wire to demonstrate lines of muscular traction in the lower limbs (QV, 4r) (Fig. 1). He describes origins, insertions, and actions of most of the muscles of the body. He demonstrates how they coördinate in walking, sitting, etc. Omissions and errors are frequent but the bulk of the work is excellent and far surpasses all previous and contem-

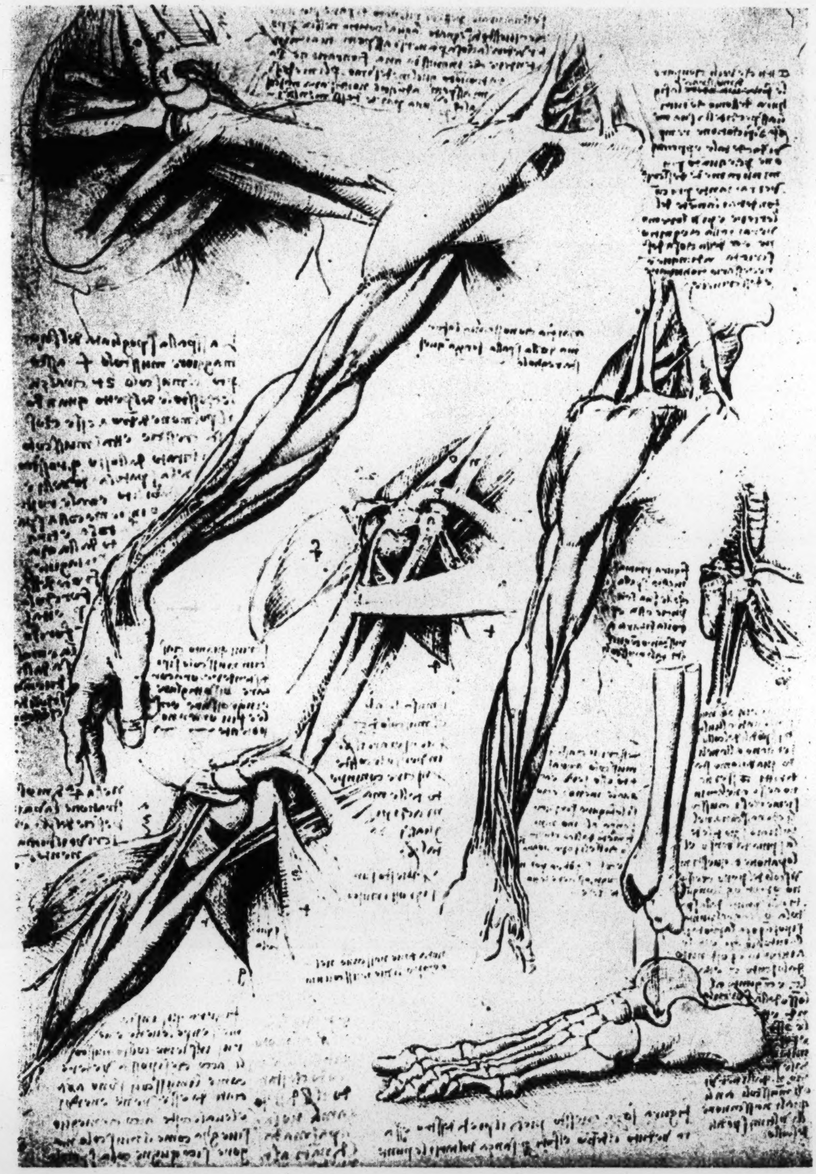


Fig. 2. A Typical Page of Drawings of Skeletal and Muscular Systems (Taken from "De l'Anatomie Feuillets A, Les Manuscrits de Léonard da Vinci, Paris, Rouvèyre, 1898).

porary efforts. Verdier quotes most of the significant passages.[5] The drawings today are enough to grant him a unique place in the school of anatomical illustration, of which he is the accepted founder (Fig. 2). However, his most astounding observation in muscular physiology is that when there is contraction of one muscle there is relaxation of its antagonist and that this is a rule "to be described in the action of all the muscles" (An A, 15v). As McMurrich points out,[3] this is an interesting foreshadowing of Sherrington's law of reciprocal innervation of antagonistic muscles.

Leonardo's various ideas of the brain ventricles are revealed in the attractive brown and red sketches of the fifth volume of the "Quaderni" (Fig. 3). They constitute his largest contribution to the physiology and anatomy of the nervous system for he breaks entirely from the traditional views which dominate his first drawings. He supposedly devises a method of securing wax models of the ventricles and is thus able to work out the relationships from his own observations. Quotations from his written explanations follow:

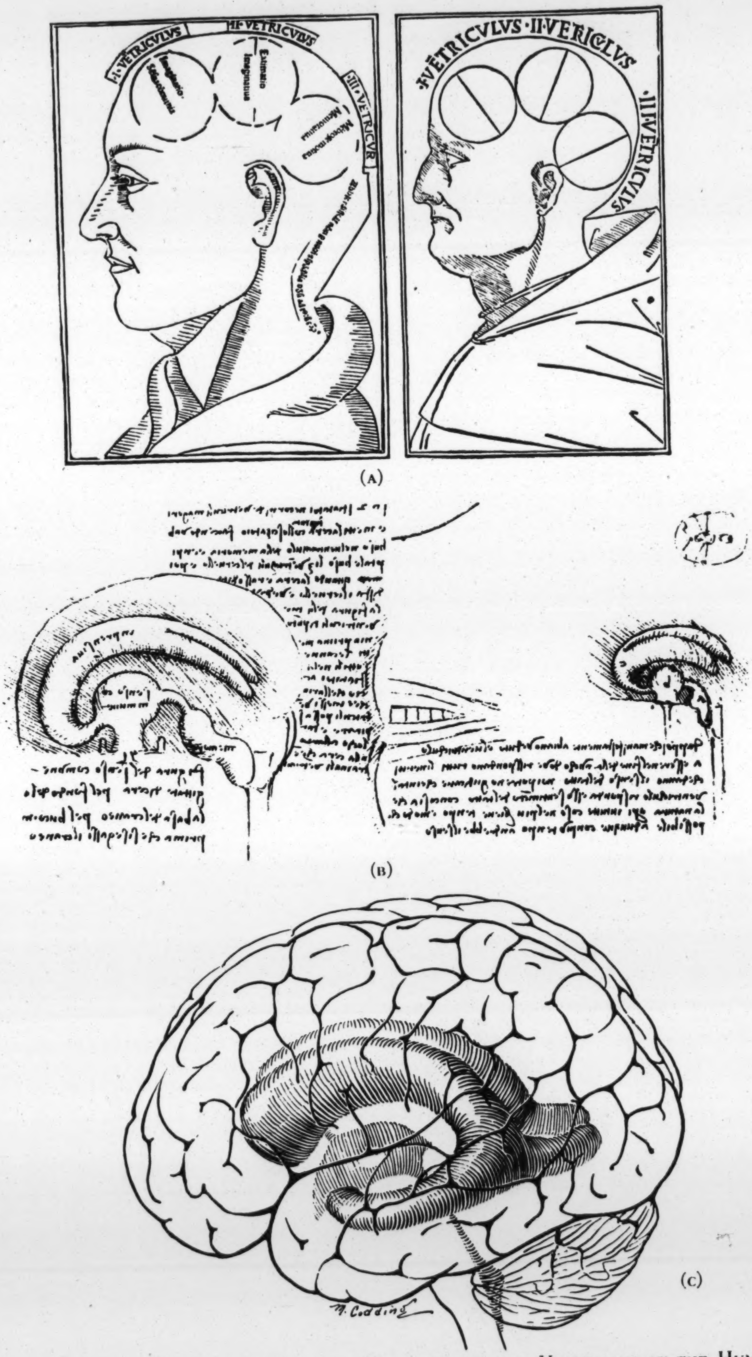
> Make 2 air-holes in the horns of the great ventricles and put the melted wax by means of the syringe, making a hole in the ventricle of the memoria, and fill through such hole the 3 ventricles of the brain; and then, when the wax has curdled, split up the brain, and you will distinctly see the form of the three ventricles. But first put the tiny tubes into the air-holes, that the air which is in these ventricles may escape and give room to (the air) the wax which enters the ventricles. [QV, 7r]
>
> . . . On the muscle called worm which is situated in one of the ventricles of the brain which lengthens and shortens itself, to open and shut the passage of the impressiva or the sensus communis to the memoria. [QIV, 11]

Again in ideas of localization of function in various parts of the brain does he form his own concepts. The posterior ventricle is associated with memory, the middle with "senso commune" or sensation, and "volunta" or will, and the anterior with "inprensiva" and "intelletto." These ideas are further elucidated in the passage:

> Accordingly the joints of the bones obey the tendon, the tendon the muscle, the muscle the nerve, and the nerve the senso commune. And the senso commune is the seat of the soul, memory its admonition, and the inprensiva is its referendary. [AnV, 2]

Nerves are thought to be hollow tubes carrying "pneuma" in either direction. Of how these function we have glimpses in the following quotations:

> These nerves having entered the muscles and lacertae command them to move; they obey, and this obedience sets them in action so that they swell, and the swelling shortens their length and pulls back the tendons that are interwoven with the particles of the member. Being infused in the extremities of the digits they carry to the sensorium the cause of their contact. [AnB, 2]
>
> The function of the nerve is to give a sensation (stimulus) and they are the cavaliers of the soul which have their origin from its seat and command the muscles that they move the members at the volition of this soul. [QII, 18v]
>
> The nerves act by themselves without orders from other functions of the mind . . . one sees paralytics with their muscles such as head and hands, move without the permission of the mind. [Quoted from Vaccaro[14]]



(A)

(B)

(C)

Fig. 3. The Evolution of Ideas as to the Structure of the Ventricles of the Human Brain. (A) Albertus Magnus. Summa Naturalium, Brescia, 1490. Fol. 40a, Illustrating the Early Belief in Ventricular "Localization." (Kindness of Dr. W. W. Francis, Osler Lib., McGill Univ., Montreal). (B) Leonardo's Figures Based Most Probably upon Wax Models (QV, 7r). (C) A Modern Construction of the Brain Ventricles (by Miss Mildred Codding).

He says that muscles may retract or extend solely on account of the nerve from which they receive the stimulus (AnB, 3v) and indicates that there are two kinds of nerves, motor and sensory (AnA, 13v). At least, he states that upon injury to the hand sensation in the fingers may be lost and motion retained, or sensation retained and motion lost. Special functions of the cranial and spinal nerves are variously described. He performed experiments on frogs, the first to be done on the central nervous system since Galen's time. His description follows:

> The frog retains life for some hours when deprived of the head, and heart, and all the intestines. And if you prick the said "nervo" (cord) it suddenly twitches and dies. All the nerves of the animals derive from here. And if this string is pricked it suddenly dies. The frog instantly dies when its spinal cord is perforated. And formerly it lived without head, without a heart, or any entrails or intestine or skin. It thus seems that here lies the fundamentum of motion and life. [QV, 21]

Sight is Leonardo's chief interest among the special senses, and that largely from the point of view of the artist. Much of the second part of the "Traité de la Peinture,"[6] his treatise on painting, is given over to consideration of the physics of light, shade, luminosity, and reflection. Scattered notes in all of his manuscripts show that he is always interested in optics and performed various experiments on the effects of sudden illumination and pin-hole camera phenomena. Richter[7] has translated a good many interesting passages and special studies have been made by Angelucci[8] and Elsässer.[9]

Of the digestive system there are few drawings or notes. He is the first to correlate the form of the teeth with their function; that is, molars as grinders or incisors as cutters. He writes of the movements of the tongue, knows that it is a sensory organ and that it aids in enunciation, articulation and mastication. He supposes that the uvula aids in smelling. He describes peristaltic movements of the esophagus. The longitudinal and circular muscle walls of the intestinal tract are said to give strength so that "no transverse or longitudinal or oblique force may break through" (QI, 5v). He adds that the intestine and everything that is adapted to enlargement and contraction have transverse and longitudinal fibers, as are seen "in the texture of cloth." This explanation of the coiling of the intestines is interesting.

> Animals without feet have a straight intestine for they are always lying down. But man, being erect, the stomach would quickly empty itself were it not for the coiling of the intestine, and if the intestine were straight, every part of the food would not be touched by the intestine, and thus much would remain undigested and could not be absorbed by the intestines and carried to the meseraic veins. [AnB, 14v]

Four functions of the abdominal wall are enumerated. First, it presses and elongates the coils of intestines; second, by pressure it forces the intestine against the stomach and causes the latter to emit chyle through the pylorus; third, it forces the stomach against the diaphragm causing it to assume convex form; and fourth, it presses inspired air out of the lungs as a result of the raised diaphragm. Defecation is aided by the forward position of the body compressing the intestines against the pelvis and by the pressure of the transverse muscles (located by Leonardo in the peritoneum and not in the abdominal wall) (QII, 16). Any retro-movement of intestinal contents which might be expected to result from such compression is prevented in two ways. The stomach is pushed against the diaphragm and so will more likely void its own contents than receive backflow from the intestines. The duodenal contents are the most liquid of all intestinal material and thus are the first to be expelled after the pressure is exerted. They pass on down the canal, leaving the jejenum full of gas (QI, 7). The appendix acts as a safety valve for the excess gas (AnB, 14v). He describes the gall bladder as the "servant of the liver," cleansing it of impurities, and the liver as the "distributor and dispenser of vital nourishment" (AnB, 2v). The necessary heat for the process comes from the heart. He formulates a general physiological law that sphincters are relaxed by stimuli furnished by the substances that pass through them.

> All the said shuttings are opened by the things which leave the place shut by them, as the anus by the superfluity of food . . . and then it is shut because of the muscles. [QIV, 11]

He adds that the seminal vesicles, urinary bladder, and mouths of membrum, vulva, and uterus act similarly. The spleen cannot be removed without death "on account of veins with which it nourishes the stomach." (AnB, 11v)

GENITO-URINARY SYSTEM

In the meager notes on the excretory system Leonardo observes that the quantity of urine given off is an index of the blood passing through the kidneys (QI, 10r). He queries "where the neck of the bladder shuts and why," (QIII, 11v), and adds a note on "the nerves or one may say the muscles that shut the gate of the vesica (bladder)." (QIV, 11r). The possibility of a back flow of urine from the bladder into the ureters and kidneys had been argued by earlier writers. Leonardo attacks the problem on hydraulic principles which he knew so well and refutes a good many of the earlier ideas. (AnB, 14 and 37)

Leonardo accepts, in the main, the ideas of his day about the functioning of the reproductive organs: namely, that there is a female, as well as a male sperm, that both are formed from the blood at the third concoction, that testes and ovaries supply the generative virtues, that the sperms are then stored in the uterus and seminal vesicles respectively, and that the generative virtue of the female sperm becomes active only when mixed with the male sperm (QIII, lv, 2r, 3v, 10v). He is, however, ready to argue against the traditional view of Mondinus about the function of the seminal vesicles and opposes the view that the testis could open and close the mouth of the seminal vesicles by occlusion and retraction and so regulate the emission of sperm (QI, 12r and QII, 17r). In the coition figures he draws two canals in the penis, an upper one for the sperm, and a lower one connecting with the bladder for the passage of urine. He asks why the testes are the "cause of ardor" (QIII, 3v) and what they have to do with "coition and the sperm" (QIII, 3v). His observations on castrated animals lead him to regard the testes as the seat of emotion. He recognizes that the turgidity of the penis is due to blood (AnB, 2v) and observes that in hanged victims it is often erect.

(Fig. 4), with enough comments on the transfer of materials from mother to fetus to show that he had expanded

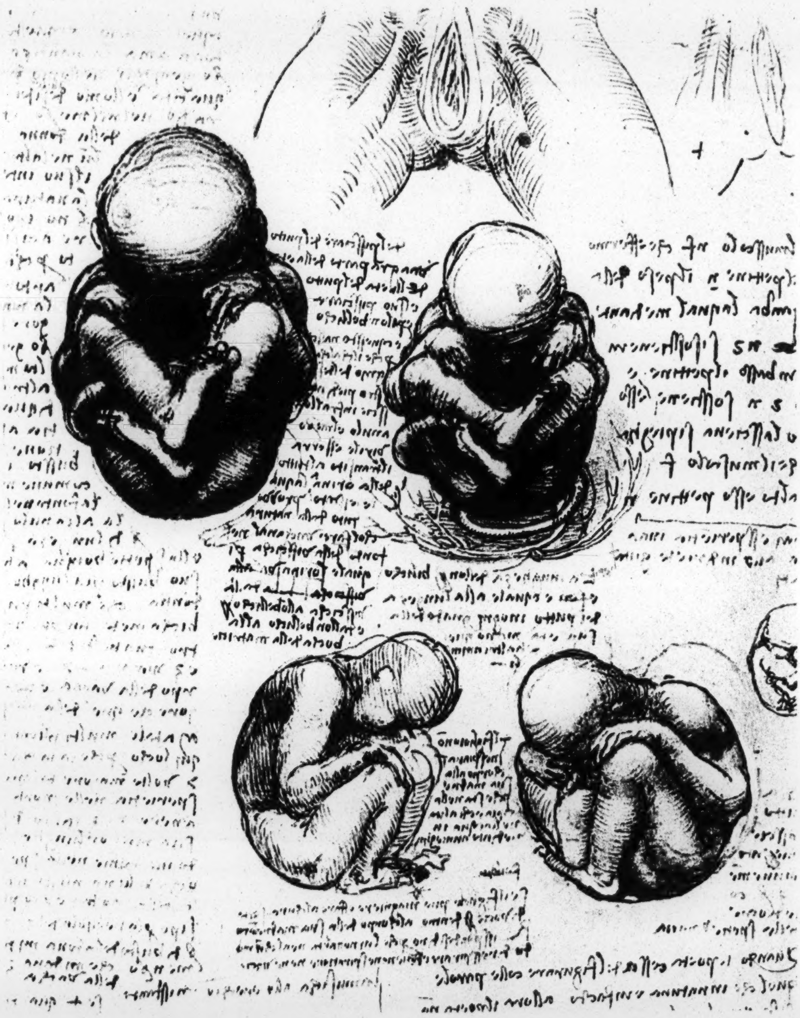


FIG. 4. SKETCHES OF THE HUMAN FETUS. ORIGINAL IN COLOR. (QIII, 7R.)

Several references show that he intended to study embryological development in incubated chicks though there is no evidence that he carried out the plan. His studies give for the first time the correct position of the human fetus in the uterus (QIII, 8r)

considerable thought on the physiological problems arising in fetal life. Incomplete understanding of the circulation of blood and internal respiration make it impossible for these ideas to be very accurate. He is also interested in the growth of the child

(QIII), particularly in changing body proportions, for he has devised an elaborate canon of proportions in the adult[10] (QVI). The following statement might indicate that Leonardo knew something of the laws of heredity and understood the true nature of fertilization, but that is hardly possible.

> The blacks are not caused by the sun in Ethiopia because if the black impregnates the black in Scythia she bears black and if a black impregnates a white woman she bears grey; and this demonstrates that the seed of the mother is potent in the embryo equally to the seed of the father. [QIII, 8v]

Sex determination from the shape of the egg is another interesting observation (QIII, 7).

Heart and Circulation

Leonardo's chief interest lay in the heart and vascular system if the volume of material left to us today be taken as the criterion. About one-fourth of the drawings collected in the "Quaderni" are of the heart and circulatory apparatus (Fig. 5). A goodly number of these, particularly of the heart, are taken from animals. Klebs[11] has given a careful summary of Leonardo's evidence which caused him to regard the heart as a muscular pump: (1) recognition of the rôle of systole and diastole, (2) alternation of auricular and ventricular systole, (3) synchronism of ventricular systole, of heart beat against the chest wall, of entrance of blood into the auricle, and of arterial pulse beat, (4) transmission to the periphery of the sound produced by the shutting of the valves, (5) definition of rhythmic heart contraction. ("After the systole follows the diastole in two-thirds of a harmonic tempo.") He demonstrates most effectively the shutting of the valves and talks of those "which shut from without inwards" and those which shut from "within outward." (QIV, 114 and 11v, and 12r.) His studies give evidence that he made wax models of the semilunar valves and studied their mechanism in great detail. He has made many sketches of the swishing of blood about the valves. This recognition of the heart as a muscular organ is a great step forward. The Galen-Avicenna concept was that this organ is peculiar and composed of something aside from muscle. Leonardo, however, applied his ideas of muscular physiology to the heart and so traces out the left vagus to the heart (AnB, 33v) and plans to see if this nerve is the stimulating force and "if such nerves give motion to the heart, or if the heart moves of itself" (QIV, 7r).

The question whether Leonardo really comprehended the circulation of the blood is almost as much debated as the older argument as to whether he did his own dissections and not as easily answered in the affirmative as the latter. The Galenic tradition supposed, first, a movement of blood in two separate systems, arterial (in the left ventricle, supplying energy) and venous (from the liver to the right ventricle, supplying nourishment), second, perforation of the intra-ventricular septum allowing the blood to pass through the septum, and third, an innate heat in the left ventricle which must be constantly cooled in the lungs. Richter in 1883 first suggested that Leonardo had a modern idea of blood circulation. Holl, a conservative and thorough student, said that there is not enough material to judge. Both believed that he knew nothing of it. Of the more recent students Hopstock,[12] who edited the "Quaderni," is inclined to believe that Leonardo came "very near to the conception of the circulation of the blood." Klebs[11,13] feels it strange that a man as proficient in hydraulics as Leonardo could have ignored the course of blood in the body. Vaccaro's[14] more superficial work stands in the affirmative, but McMurrich's[3] monumental study seems to throw more

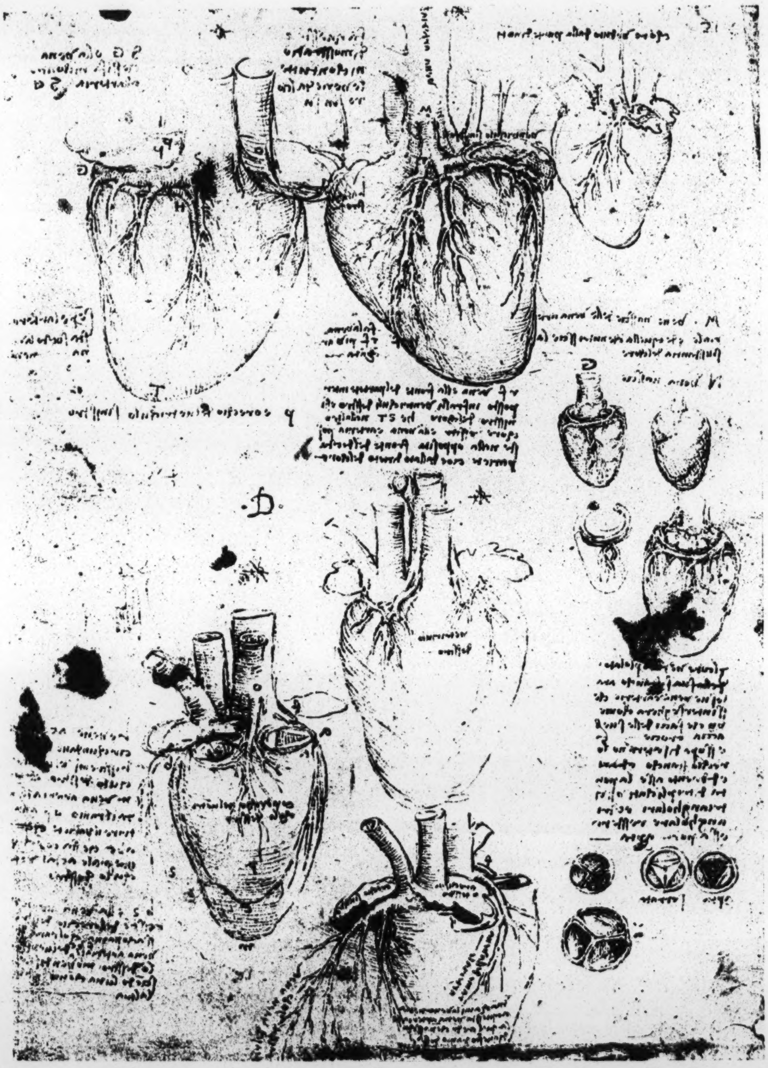


FIG. 5. A FOLIO OF SKETCHES OF THE HEART. NOTE PARTICULARLY THE CORONARIES. THE DRAWINGS OF THE SEMILUNAR VALVES MAY HAVE BEEN TAKEN FROM MODELS MADE OF THE VALVES. (QII, 4R.)

evidence to the negative. The passages most often quoted to support one side or the other follow:

> By ramifications of the vena cava in the mesentery the aliment from the corruption of food in the intestine is attracted and finally returns by the extreme ramification of the artery to the intestine. [AnB, 3]

And a part of that idea to which Leonardo so often returns, a similarity of man, the microcosm, to the earth, the macrocosm, in the statements:

> The origin of the sea is the reverse of that of the blood for the sea receives into itself all the rivers which are totally produced from aqueous vapors that have ascended into the air, while the sea of the blood is the source of all the veins. [AnA, 4]

and:

> The water which from the extreme profundity of the sea rises through the strength of its motor to the heights of the mountain finds there open veins, enters them, returning by the shortest way to the deeper sea. [Quoted from Klebs,[11] p. 50.]

Of pulmonary circulation he asks:

> Whether the veins of the lungs do not return the blood to the heart when they contract to expulse the air? [QI, 5r]

He refutes a traditional view in:

> To me it seems impossible that any air can penetrate into the heart through the trachea. [QII, 1r]

That the majority of these refer to the passage of blood to and from the heart without any reference to a continuous circulation is readily seen. If Leonardo believes, as he writes and draws, that there are passages in the intraventricular septum it is difficult to see how he pictured the process. Klebs,[11] however, argues that the orifices in his drawing do not actually penetrate the septum. It is interesting to see that he works out the amount of blood pumped by the heart. This is an argument Harvey uses to favor his circulatory theory, but as McMurrich shows,[3] Leonardo's figures are neither accurate enough nor carried far enough to have aided in proving or disproving any ideas of circulation. Vaccaro[14] suggests that a visit of Harvey in 1599 to Padua may have given him access to Leonardian manuscripts and thus be responsible for "De Motu Cordis."

Leonardo describes accurately "moderator bands" which go from the septum to the ventricular wall, giving as their function the prevention of ventricular overdistention, which is a recent interpretation after rediscovery of these bands.

Pigs were killed in Tuscany by stabbing the animals in the heart. Leonardo writes at length of the movements of the heart as judged by the movements of the stabbing instrument acting as a lever and the chest wall as a fulcrum (QI, 6r) (Fig. 6). He notes the effect of the piercer entering at various angles and during various phases of the heart, anticipating by 300 years later methods (See Van Leersum[15]).

He states that the coronaries nourish the heart. That he had observed the clotting of blood and fibrin formation is evidenced by a description of the blood in the right ventricle as being:

> . . . transformed into minute threads like the worm of the middle ventricle of the brain. And these fibers multiply like thick and short oakum and in the course of time wind themselves round the chordae of the valves which shut the right ventricle. [QI, 3v]

The autopsy performed on the centenarian in the hospital of Santa Maria Novella in Florence leads Leonardo to describe arteriosclerosis of blood vessels though he does not specifically describe calcification of the vessels (AnB, 10).

OTHER SYSTEMS

Again it is Leonardo as the mechanic who is chiefly interested in the respiratory system. He writes at length on the movements and functions of the diaphragm (QI, 4v, 5r, 5v, 6 and QIV, 1r). It is supposed to act as a respiratory muscle, to press on the stomach and so push food into the intestines, to help the abdominal wall to expel the feces, and to separate spiritual parts, i.e., lungs and heart, from the natural parts, the abdominal organs. Many observations prove his ideas concerning the mechanism of respiration, i.e., that movement of the ribs with flattening of the diaphragm create a vacuum in the thorax and so allow air to rush into the lungs, and that contraction of abdominal muscles by pushing up the abdominal contents and contraction of internal intercostals in pulling up the ribs aid in expiration. The lungs traditionally supply the crude substance from which the "vital spirits" are made and constantly cool the blood. Leonardo is little interested in the "vital spirits" and believes that something from air in the lungs is transferred to the blood by mere contact of the ends of the air tubes and the blood vessels, though he can find no communications (QII, 1). The existence of the pleural cavity is proved in both drawings and notes. He asks in a memorandum of January 9, 1513 whether, in a dead dog, "between the lung and its chest wall any quantity of air disposes itself" (QII, 7) and in another note says there is some (AnB, 17). The stimulation or cause of respiratory movements apparently did not arouse

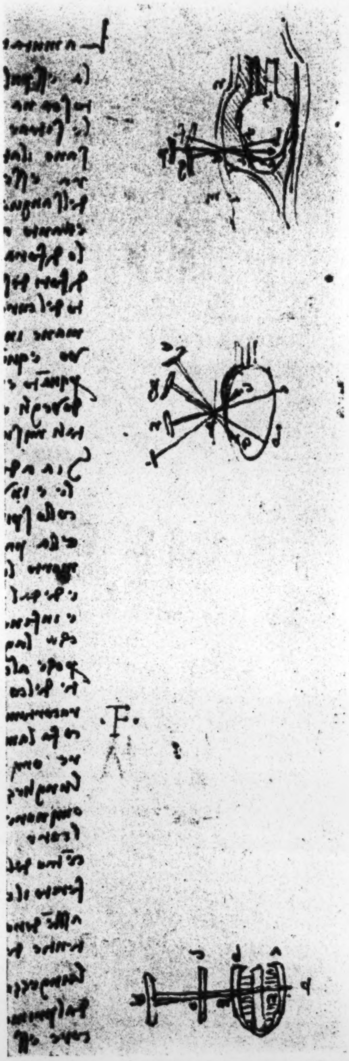


FIG. 6. FIGURES REPRESENTING THE HEART AS PIERCED BY A NEEDLE. THE TEXT CONTAINS DESCRIPTIONS OF THE MOVEMENTS OF THE HEART AS EVIDENCED BY THE DIFFERENT POSITIONS OF THE PIERCING INSTRUMENT, WHICH ARE MARKED BY LETTERS ON THE FIGURES. (QI, 6R.)

curiosity on Leonardo's part. He does observe that the lungs may cease to act voluntarily or "on forgetfulness" (AnB, 13).

Voice production interests him greatly for he is concerned with sound production of all kinds. He had gone to his first benefactor, the usurper, Sforza of Milan, with a silver lute, all of which he had designed and made. He does not know of the vocal cords but recognizes the larynx as the seat of sound production. He further recognizes the importance of the shape of the resonating chambers of the mouth in the production of vowel sounds (QIV, 10r and v). Pitch he mistakes as a function of the length and diameter of the trachea and compares the process to that of sound production in organ pipes.

Emotional states are the source of constant query to Leonardo, the artist and searcher after truth. His sketches corroborate many tales of his attendance at hangings, Savonarola's fanatical sermons which so moved the crowds in the Duomo, any gatherings in which mob spirit reigns, his love of grotesque faces, et cetera. He even notes the physical signs of emotion in friends. Merejkowski[16] in his colorful life of da Vinci emphasizes this trait and draws a vivid picture of Leonardo coolly observing his benefactor, Sforza of Milan, at the death bed of Sforza's wife, the beloved Duchess Beatrice. Some foreshadowing of hormone action can be read into the following two observations in the Leonardian manuscripts, though admittedly with great imagination. First, there is the story of the stallion which could scarcely move on account of excessive fatigue and yet, at sight of a mare, quickly recovered his forces and overtook the mare (AnA, 18). He doubts if the nerves could furnish enough air for so sudden a recovery but has no other explanation for the incident. Secondly, there is the query as to why the testes are the "seat of ardor" (QIII, 3v). He sees the thyroids only as glands filling a space where muscles are lacking and thus serving to keep the trachea apart from the clavicle (AnA, 3).

Again Leonardo might be credited with a prevision of modern ideas of metabolism if we read his account of "how the body of animals continually dies and is born again," in which the process is compared to the burning of a candle. We are told "if you supply it with just so much as is destroyed day by day, then it renews its life just as much as it is consumed."[1] That he definitely discards the idea of an innate heat which had held sway for such long centuries, is particularly noteworthy. He explains the heat production as follows:

> . . . because the warmth of the heart is generated by the quick and continuous motion which the blood makes by the friction caused in itself through its revolutions—and also by the friction which it makes on the dimpled wall of the right upper ventricle. [QI, 4r]

The question if Leonardo forecasts mechanistic views of today is one full of speculative interest. We can read in his writings:

> Where there is life there is heat and where there is vital heat there is movement of humors.

that:

> Motion is the cause of all life.

and the assertion that all vital principles come from the sun and the heat of living creatures proceeds from the vital principle.[3,1]

Plant physiology is discussed by Leonardo in a part of the volume given largely to his ideas of painting. This interest originated most probably from his studies on light and shadow in landscapes.[6] He says:

> Plants are nourished in summer through their leaves by the dew and the rain, in winter by the contact they have with the soil by means of their roots.

He knows that dew can penetrate leaves. He experiments with a gourd, cutting off all but one rootlet and nurturing sixty other gourds if he gives enough water to the first one. Detailed studies of attachments of leaves show that often linear arrangements facilitate the free access of light, air and moisture. The determination of the age of trees by counting growth rings is discovered as well as the relations of the width of a particular ring to the drouth of that particular season of growth and that the southern side of a tree in a northern hemisphere tends to produce wider rings because of the increased exposure to the sun. Exogenous growth explains the roughness of bark. Heliotropism is often observed and he tries to poison or destroy the fruit of a tree by forcing arsenic and sublimate into the pith during the ripening process.

To judge Leonardo as a physiologist will be as difficult as to judge him as anatomist, engineer, or master of any other field in which he labored. Of his works only small fragments are left. Could the work of a modern worker be evaluated properly by a few loose pages from his data recordings? We must, as Bailey[17] so aptly says, judge "by the insight and breadth of his conceptions rather than by the finished product."

His contemporaries, perhaps, knew little of his biological work. Merejkowski[16] gives a most entertaining and illuminating picture of a duel of learning in the Milanese court of Ludovico Sforza where, in the words of a chronicle of the time, "like bee to the honey comes every man of learning." Leonardo was at this court for two long and fruitful periods during his life, years of work on the equestrian statue and *The Last Supper*, and during this time he carried out so many "anatomies" (or autopsies) that Sabba la Castiglioni, a contemporary, writes[18]: "when he ought to have attended to painting . . . he gave himself entirely to . . . anatomy"; in odd moments constructing a bathtub for the Duchess that three parts of cold and one part of hot water would flow automatically; always teaching painting, now squaring circles, again explaining paleontological remains, and so on *ad infinitum*. Then one day, a duel of knowledge at the court. The learned heads from the neighboring university at Pavia argue in scholastic style:

> Are handsome women more prolific than homely?
>
> In which inner part did the water originate which flowed out of the Lord's wound when pierced by the spear?
>
> Is woman an imperfect creation of nature?

Finally Leonardo is asked to talk. The learned men in almost modern fashion ask "what works has he ever written?" Merejkowski has Leonardo in simple and lucid manner talk of sea shells and what he has observed and deducted from a study of them. The learned men attempt to explain

Leonardo's findings by the Great Deluge, or astrology, or laws of dialectics and Leonardo replies, "All this is not so. There is no higher or lower knowledge—but one only, flowing out of experimentation."

This spirit of scientific investigation coupled with a thoroughness not paralleled by his medieval predecessors and contemporaries must be the cornerstone and headpiece of the monument we build to Leonardo, the physiologist. In using new methods of wax modeling, serial sections, imbedding and sectioning tissues he may have added to specific experimental methods. In his schematic drawings he undoubtedly made possible our understanding of many processes. In discovering the correct curvature of the spine and the inclination of the pelvis, the true relationships of the fetus in a unilocular uterus, and the atrio-ventricular band of the heart he added to the store of scientific knowledge, but it is not with these details that we may judge his contribution. His dreams of what he wished to do in physiology challenge even a writer of today. He would begin with the conception of man, the manner in which the child is nourished and grows in the womb, how it is expelled, its development in childhood and then consider:

> The cause of breathing, the cause of movement of the heart, and the cause of vomiting, of the descent of food from the stomach, of the evacuation of the intestines, of the movement superfluities of the intestine, of swallowing, of coughing, of yawning, of sneezing, of numbness of different members, of the loss of sensation of any member, of tickling, of desire and other needs of the body, of urination and similarly of all the natural actions of the body. [AnB, 1v]

and finally:

> Figure whence is derived catarrh, tears, sneezing, yawning, trembling, falling sickness, madness, sleep, hunger, lust, anger, when it acts on the body, fear similarly, fever, disease, where poison acts . . . Figure whence comes the sperm, whence the urine, whence milk; how food is distributed by the veins; whence drunkenness, whence vomiting, whence gravel and the stone . . . whence dreaming, whence frenzy by disease; why it is that the arteries being compressed the man sleeps, why when the neck is pierced the man falls dead; whence come tears, whence is it that in turning the eyes the one follows after the other, of sobbing. [AnB, 21]

We may say with Vasari[19] that:

> Leonardo was in all things so highly favored by nature that to whatever he turned his thoughts, mind and spirit he gave proof in all of such admirable power, and perfection that whatever he did bore an impress of harmony, truthfulness, goodness, and grace, wherein no other man could ever equal him.

We may name him a founder of physiological anatomy with Garrison;[20] we may explain him as "an end result of uncompromising realism"[21] of the quattrocento Florence or "too much a hybrid" of realism and idealism;[22] we may sing with McCurdy[18] of his mind as "trying all things, expounding all things, proving all things"; but his own reflections on the heart seem to pass judgment on Leonardo, the man, and Leonardo, the physiologist, as well as any:

> With what words will you describe this heart so as not to fill a book . . . the longer you write minutely, the more you will confuse the mind of the auditor. [QII, 1r]

I wish to write a particular note of gratitude to Dr. John F. Fulton. Without his personal

Leonardian library this work could not have been begun and without the stimulus of his enthusiasm it would not have been completed.

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JOHN LOCKE

PHYSICIAN AND PHILOSOPHER

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PART II (*Conclusion*)*

JOHN LOCKE'S "OBSERVATIONES MEDICAE" FROM THE ORIGINAL MANUSCRIPT IN THE BRITISH MUSEUM. OBSERVATIONS. SEPTEMBER 1667

These notes first appeared in "Locke as a Medical Practitioner," by Dr. E. T. Withington, *Janus*, Archives internationales pour l'Histoire de la Médecine et la Geographie Médicale, 1899. The article contains a transcription of Locke's "Observations Medical" from the original manuscript in the British Museum. The title is "Original Medical Papers by John Locke presented by William Seward Esqre." These observations consist of notes written by the author on separate sheets of paper with limited punctuation. The transcriber says that some words have been omitted on account of their illegibility. These Latin notes are printed with the permission of the Editor of *Janus* to whom my grateful acknowledgements are made. They consist of case histories together with methods of treatment including numerous prescriptions. When it is considered that in all probability only a small portion of Locke's notes have been rescued, the Latin notes here presented give a fair idea of the importance he attached to what he considered his real vocation.—J.H.D.

Hydrops. Luce, ancilla culinaria . . . annorum a duobus annis laboraverat pedum et crurum humore qui nocte evanesciebat rediitque postridie. Ulcusculum etiam circa talum aquam emittebat. Medio Septembri me consiluit ob jam enim aliquamdiu intumuerat venter. Menses erant decolores, post quorum fluxum aliquanto detumuit abdomen. Urina erat justo coloratior, sitiebat, dyspnoea moderata, parum datat.

Sept. 11°.
R. Aquae absynth. unc. iii
Diaturbith cum rheo ʒ i

Misce. f. Haustus, quem ebibit et statim evomuit, 6ies tamen dejecit, et quia non satis purgata est:

12°.
R. Diaturbith cum rheo ʒ iii
Aq. absynth
Aq. centaur. min. āā unc. ii ss.
Misce, fiat haustus.

Potus erat decoctum baccarum juniperi, et nihil bevandum (!) nisi quod ad cibos diluendos tenuem cerevisiam interprandium ei permiseram. Hujus decocti usum continuit usque ad 28 Septembri, quo melius habuit.

28°.
R. Calyb pp. cum sulph. unc. ss.
Aloes (!) trochisc. et Rhabarb.
āā unc. i
Croci ʒ i

Fiat massa, de qua capiat ʒ i omni mane.

R. Conserv. fl. tamarisci et capilli Veneris āā unc. ii
Conserv. radicis Inulae-campanae ʒ vi
Calyb p.p. cum sulph. unc. i
Salis tamarisci, vel in defectu ipsius
Tartar. vitriolati ʒ i
. . . .
cum syrup. de condit. citri q. s.

Fiat opiat: de qua capiat quantitatem nucis moschatae quotidie hora 4ta pomeridiana; perseveret etiam in usu decocti baccarum juniperi. Ex horum usu melius

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*Part I appeared in the January, 1932, issue of ANNALS OF MEDICAL HISTORY, p. 12.

habuit et crura minus intumuerunt, et ulcus remittente dolore consolidari incepit; sed quia ob negotia domestica curationi non vacavit, intermissa est medicatio et redierunt etiam omnia mala.

7°. Januarii me iterum consiluit, cui haec precepi:

R. Gummi Guttae gr. vi

conterantur crassiusculae, infundantur per noctem in vini albi gallici ℥iiii. Mane parum incalescat, coletur, tepidiusculum bibat. Hoc epoto cathartico semel vomuit, bis dejecit.

8°. Jan. Proximo die propinavi:

Gummi guttae gr. x
Cinamomi ʒ ss.
Aq. cinam. tenuior. unc. i
Vini albi unc. iii

Hoc sumpto bis vomuit, quinquies dejecit.

10°. Jan. Cum jam gelu esset:

R. Gummi guttae gr. xiii.

Infundantur in vini albi unc. iii, per noctem stent et admiscantur sp. salis guttae xx. Ex hoc etiam vomuit bis et dejecit.

8°. Feb.

R. Vini albi unc. iii
Sp. salis ad levem aciditatem.
Gummi guttae gr. xiii.

Infundantur omnia per noctem calore cinerum, mane coletur et fiat haustus cum regimine sumendus. Ex hoc bis vomuit et bis dejecit.

12. Feb.

R. Vini albi unc. iii
Gummi guttae gr. xiii.

Infunde ut prius et capiat cum regimine. Ex hoc bis vomuit et septies dejecit.

R. Aperinos
Cochleariae hortensis, marinae,
Salviae, āā manipulos ii
Cinerum genistae lib. i.

Infundantur omnia in cerevisiae mediocris gall. ii ex qua bibat quotidie. Unde melius habuit, detumuit venter.

23°. Feb.

R. Vini albi unc. iiii
Spt. salis q.s. ad levem aciditatem.
Gummi guttae gr. xv.

Infundantur per noctem, capiat cras mane. Ex quo semel vomuit dejecit quater.

7°. Mai.

R. Vini Rhenani unç. ii
Aq. cinam. tenuior unc. ī
Gummi guttae gr. xv.
Ol. Vitriol q.s. gratam aciditatem.
M. fiat haustus. Capiat cras mane cum regimine.

12°. Mai. Cum diu abfuissem, alio advocato medico sumpsit;

....

....

Ex quo 30 habuit sedes, multumque debilitata est, et post duos vel tres dies pustulae in crure undique circa antiquum ulcus multo cum dolore enatae sunt quae sponte sanabantur ita tamen ut cuticula renovatur.

28°. Mai. Iterum repetiit postum ex cerevisia cui infundebantur salvia, aperinos, cochlearia hortensis, et marinae ana M. ii, cum cineribus genistae lib. i ex cujus usu prius melius habuit.

21°. Junii. Omissa hactenus cura repetita est.

R. Gummi guttae gr. xii.
Tartari vitriolati gr. viii.
Olei vitriol gr. iiii.
Aquae cinamomi unc. i.
Vini canariensis unc. ii.

Misce, fiat potio. Egrota statim evomuit, bis tamen postea vomuit et ter dejecit.

22°. Junii.

R. Aq. florum sambuci
Vini rhenani opt. ana lb. ss.
Syrupi e quinque radicibus unc. iii.
Spt. salis dulcis q.s. ad tratam aciditatem.

Capiat. unc. iii bis in die longissime a pastu.

R. Theriaci veteris
Croci martis ana ℈ i

....

(Hujus historiae cetera desunt.)

1668.

Tussis Sicca. P. Locke (philosophi consobrinus) 14 annorum, progressa hieme suscepto frigore cum forte a madore viarum pedes non satis defenderat, tussi vehementer corripiebatur, quae paulo remissior sed perpetio sicca usque ad Aprilem duravit. Color faciei floridus habitus ἄσαρκος nulla febricula, appetitus satis validus.

1°. Aprilis. Praescripsi extracti croci gr. i sensim propediendo ad gr. iii sumend. cum oleo succini guttae xii in aqua hyssipi hora somni. Unde remisit aliquantulum tussis, et materiem incrassatam expectoravit, sed paulo post rediit tussis iterum sicca. Semel purgatus est leniter cum ʒ ss pil. cochiae.
30°. Maii.

Absens cum eram sequentia ordinavi

1°.	Mittatur sanguis ad unc.	v–vi.
2°.	R. Glycerhizae	unc. ss.
	Herbae Scabiosae	
	" Veronicae ana	M. ī
	Fl. rosarum	
	bugloss	
	viol.	
	boragin. ana	M ss.
	Ficuum	
	Dactylorum	n v
	Jujub.	n x
	Passularum min	unc. i.

Incindantur et conterantur, superfundatur aquae perventis q.s. stent indigestione loco calido horas xii, factaque una vel altra ebullitione in vase vitro vel stanneo optime clausa, fiat colatura et expressio, de quo capiat haustum omni mane jejunus.

R. Sacchar. Candid albissimi	unc. iii
Succi Liquiritii	ʒi ss.
Spec. diatragacanth. frigid.	
" diamargarit. frigid ana	ʒi
Coral. rub. pulverisat. ut alcohol	℈ iiii

Dissolve in aqua hyssopi et cum mucilaginis gum. tragacanth. quanto sufficit, fiant trochisci instar lupen. Teneat frequenter in ore.

R. Syrupi violarum
jujub.
de ros. sic.
et de meconio ana unci. i. Misce.

Capiat cochlearium unum omni nocte hora somni.

Febris inflammatoria.

16°. Junii. Pen. Hunt, 4 annorum, correpta erat febri ardenti; ruber coccineus aderat genarum, colli, pectoris et totius corporis, dolorem circa cartilaginem ensiformen compressa sensit; lingua aliquanto alba, faucium dolor et inflammatio; pustulae minimae per cutem erumpentes.

R. Aquae, portulacae, nympheae, paralyseos ana	unc. iii
Aq. cinamomi hordeat.	unc. i
Syrupi violarum	
Syrupi de limon. ana	unc. i ss.

Misce, fiat juleb, capiat unc. iii vel iiii singulis tribus horis.

R. Decocti cinamom. pro clystere	unc. iiii
Sacchari rubri	
Syrup. viol. ana	unc. i

Misce, fiat clyster injiciend. crastino mane.

Ex quo semel dejecit cum multis flatibus et euphoria.

17. Jan. Aderat faucium dolor et linguae albedo.

R. Aquae plantag., rosarum, prunellae, ana	unc. i ss.
Diamargaritos	ʒss.
Syrupi de Rubo Idaeo	
Olei vitriol. q.s. ad levissimam aciditatem	

Misce, fiat gargarisma.

Recte convaluit inter triduum

Hydrops.

Diarrhod. abbatis	℈i
Rhob. Sambuci	ʒiii
Olei juniperi stil.	gt. iii
Syrupi e quinque radicibus	q.s.

Misce, fiat bolus, capiat hora somni et sudet.

Hysterica. H. Greenhill, virgo, 2 circiter annorum cum dolorem cum pondere circa ventriculum sentiret, recte, satis appeterit nec tamen bene concoquerit, intumescentiamque circa regionem ventriculi subinde pateretur, et haec omnia praecipue acciderit postquam aliquid animo molestum acciderit acidaque omnia cardialgiam doloremque in ventriculo excitavit, primo prescripsi. 3°. Novembri:—

R. Tartar. emetic. gr. v.

Unde 12 vomuit cum levanine proxomo die.

R. Aquae nymph. paralyseos,
lactuci ana unc. iii
acria artemisiae unc. ī ss.
Brion. compos. unc. ii
Syr. violarum
" de artemisia ana unc. i ss.

Misce, fiat juleb.

R. Conserv. flor. paeon.
Corall p.p.
brion ana ʒi
Margarit. p.p.
Oculorum cancri p.p. ana ʒi
cum syrupo artemis. quantum sufficit.

Misce, fiat electuarium, de quo capiat, quantitatem nucis moschat, longissime a pastu mane et vesperi, superbibendo haustum precedentis juleb.

Recte convaluit.

Observationes 1668.

Febris. 16°. Martii, Jane Prince virgo, 19 annorum, 16. Mart. horrore et rigore correpta est, post incaluit, deinde sudavit, postea iterum horripilatio.

18°. Menstrua jam per duos menses suppressa fluere coeperunt.

19°. Me consuluit. Pulsus celer, lingua alba, sitis, deglutitio impedita elongata uvula. Huic statim, quia nox erat gargarisma sequens ordinavi:

R. Aquae rosarum
" plantag. ana unc. iiii
Diamargarit. unc. i ss.
Salis prunellae ʒi.
Fiat gargarisma quam primum.

20°. Quia jam relaxata perstetit uvula, remittente febre, fluentibusque menstruis, sequens ordinavi gargarisma magis astringens.

R. Aq. verben. plantag. equiset.
ana unc. iii
Flor. ros. rubr. Cortic. granat.
ana p i
Seminum Cydon. ʒi ss.
Ebulliant una, colatur, dissolve diamargarit, dianuc. ana ʒvi.
Syrup. e. rosis sic. mel ros. colat
ana unc. ss.
Aquae cinamom. hordeat. unc. ss.
Salis prunellae ʒī
Spt. Vitriol. ad gratam aciditatem.

Misce, fiat gargarisma.
Rheumatismus.

28°. August. Gulielmus Aberne, juvenis torosus, annorum-conquestus est de dolore dorsi levaeque partis faciei et capitis, laevoque crure, quem subinde ingravescentem mox parum remittentem per duos dies sine somno pertulit.

30°. Me consuluit, cum jam dolor crus utrumque et dextrum humerum invaserat. Dolor hic illum primo cum horrore et rigore invaserat. Urina erat turbida. Huic statim v. s. (venae sectionem) imperavi eadem nocte ad unc. x. Sanguis erat floridus brachii sinistri, unde dolor lumborum et humeri cessarunt, remanente tamen crurum acri cruciatu, nox insomnis. Dolorem hunc cerevisiae tenui largius haustae cum incalescet, imputavit.

31°.

R. Aquae portulac., lactucae,
nympheae ana unc. iiii
Aq. papaveris rhoead. unc. vi
Syrupi viol., papav. rhoead.,
limon ana unc. i.

Misce, fiat juleb, de quo bibat pro libitu.

R. Syrup de meconio unc. i
Aq. paralyseos unc. īī

Misce, bibat hora somni.

Hora 4a pomeridiana s. v. iterum ad unc. xii brachii sinistri i.e., lateris dolentis, cujus grumescentis superficies sebacei erat coloris, qua materia albida reliquo cruore innatans crassa erat et admodum tenax. Ex hac sanguinis missione remiserunt dolores, quae post ¾ horae iterum redierunt. A sumpto hypnotico nocte dormivit mediocriter, urina turbida.

1°. Septembri. Redierunt dolores precipue ventris circa umbilicum. Iterum detractus sanguis ad unc. viii brachii dextri, qui floridus erat. Julepus repetitus dolores crurum remissiores, circa umbilicum fixi et acres.

Serum lactis bibit evomuitque, avenaceae parum admodum comedit, nauseante stomacho ab omnibus aliis abstinuit, nox insomnis.

2°. Dolor ventris intensus, transitusque ejus a sinistro in dextrum crus, urina clara et coloratior.

R. Herbae malv. parietariae. ana	M i
Rad. altheae	unc. ss.
Flor. chamomel.	M ss.
Sem. anisi, carui, ammeos ana	ʒii
Coquantur in aqua q.s.	
Catholici duplicati	unc. i
Aq. benedict.	unc. iiii

Misce, fiat clyster injiciend. quam primum.

R. Aquae parapyseos	unc. i ss, in ea dissolve
Croci graduati	gr. v.
Syrup. papav. rhoead.	unc. ss.

Misce, fiat haustus, capiat hora somni. Repetatur julep.

Tempore pomeridiano dolores ventris et crurum remiserunt, mano cum carpo dextro graviter affecto. Injecto clystere bis dejecit, bene dormirit cessante omni dolore nisi carpi dextri. Somnus mediocris, potus serum lactis et juleb, victus avenacea.

3°. Dolores remissiores et omnes praeter carpi dextri prope cessarunt, urina copiosa et naturalis, sedes mane largae et cum euphoria, diaeta eadem.

4°. Dolore recrudescente iterum v. s. ad unc. ix. Cruor sebaceus in quo serum copiosum, reliqua eadem. Hac usque circa caput continuo fere sudavit copiose, sed jam tandem sudare caput desiit. Post v.s. melius habuit cessante cervicis cruciatu, relicto solum in utroque brachio dolore remissiore. Nox mediocriter, urina citrina, tenuis, sine hypostasi.

5°. Dolor profundus ossium et carpi utriusque sed remissior, manus digitique intumescentes. Potus ptisana et juleb, cibus pommum assatum panisque butyro leviter inunctus. Urina tenuis et citrina sine hypostasi. Clyster ex posseti lib. i, syrup viol. unc. ii a quo bis dejecit. Nox insomnis in lecto nam dolor semper exacerbatur.

6°. Dolor idem, urina tenuis citrina sive flammea sine hypostasi. Potus ptisana et juleb victus tenuis dolores, nox saepe doloribus molesta.

7°. Paulum remiserunt dolores, meliusque habuit obambulans quam in lecto stratus, reliqua ut prius.

8°. Ibidem.

9°, 10°, 11°, 12°. Methodus eadem, debilitas membrorum, aliquando manus aliquando pedes intumuerunt, urina citrina, tenuis aliquando sine aliquando cum levi eneoremate.

13°. Dolor vagus juncturarum, urina citrina, tenuis, cum levi eneoremate, juleb per incuriam neglectus, reliqua eadem.

14°. Omnia eadem.

15°.

R. Aq. portulac., lactucae, nymph., papav. rhoead. ana	unc. iiii
Syr. viol. papav. rhoead. ana	unc. i
Salia prunellae	ʒiii
Misce, fiat juleb de quo bibat frequenter	unc. iii

16°. Dolor nunc hanc nunc illam partem sed non cum adeo magno cruciatu afficiens, urina citrina et clara cum hypostasi diffuso sed ad fundum matulae subsidente.

17°. Dolor vagus, eneorema in summitate urinae flammea.

18°. Dolor adhuc sed levior, urina citrina clara cum hypostasi in fundo, cui sparsim innatatant puncta nigra arenulis non absimilia.

Continuata per aliquot dies diaeta tenui, recte deinceps convaluit.

1669.

Mar. 1°. *Maculae rubrae*, aliae latae aliae parvae, cum ardore per totum corpus erumpentes et levi tumore, Febris etiam aderat, lingua alba, non sicca.—Haec omnia inceperunt levi horrore et rigore 1°. Martii, frequens aderat hypothymia. Haec passa est Martha Mason mulier 25 annorum. Hanc 4°. Martii inviso, quam invenio maculis undique conspersam tantillum supra cutem extumentibus. Prescribo juleb refrigerans, potus decoctum hordei cum liquirit: et passulis, aderat nam tussis, dietam tenuem et ἄσαρκον, regimen refrigerans. Inter quatriduum recte convaluit.

Lichen cum dolore pungenti serpens in carpo Anne Smithsby Virginis 30 annorum valde hystericae. Huic applicuit oleum ex gramine lineo igni extractum, postea meo consilio usa (5° Martii) decocto lapathi acuti cum . . . quotidie bis vel ter calide fovebat, et post fotum succum radicis lapathi acuti cum . . . subligavit, unde melius habuit, sed postea, consumpto succo, decocto solum fovebat bis vel ter de die, et post fotum emplastrum picis Burgund: applicavit, unde prefecte sana evasit.

Suffocatio et angustia pectoris, Carolus Morgan suffocationem patiebatur et angustiam pectoris, et circa collum viam spiritus mole aliquo quasi comprimi et restringi sentiebat, ructus interim crebri et suspiria profunda sine quavis doloris causa. Saepe etiam dolorem patiebatur in laevo latere ex symptomatibus plane hystericum—ab inferiore ventre ad fauces surgente dolore.

His affectibus 20°. Maii correptus est, illis etiam olim abnoxius praecipue ubi ira vel pathemati agitabatur. Maii 21° mane venesectio ad ℥ix.

R. Theriaci veteris ʒii
Corall, pp. ℈ii
Oculorum cancri pp. ℈ii
cum syrupi de artemisia quanto sufficit.

Misce, fiat bolus. Capiat hora somni. Ita leviter in lecto tectus decumbat ut nocte non sudet. Proximo mane posseto calefacto excitatur copiose sudor; unde melius habuit.

R. Thriaci Andromachi ʒ ii
Syrupi de ments: qs.
Corall: pp. ℈ i ss.
Perlarum pp. gr. xv

M. fiant pilulae n°. xviii. Capiat 6 hora somni, et triduum vitet carnem et vinosa, unde perfecte convaluit.

1670.

Observationes. *Morbilli*. Feb. 27°. invisi puerum trimum, filium—Painter cui pustulae parvae rubrae supra cuticulam vix eminentes inequaliter dispersae frontem, mentem, et praecipue genas obsidebant, per superiorem partem etiam pectoris aliquae rubrae maculae instar pulicum morsus hinc inde cuticulam decolarabant, quae maculae intra 6 horas et numero et latitudine plurimum auctae longius etiam versus abdomen dispergebantur in cruribusque autem, femoribus, imoque ventre nullem earum apparuit vestigium. Horum autem exanthematum ex narratione parentum historiam collegi.

23°. (1) diarrhoea, 24°. (2) diarrhoea, distillatio ex oculis naribusque, tussis, sitis continua, ἀνορεξια calor frigusque alternis vicibus recurrentes, somnolentia, 25° (3) omnia eadem.

26°. (4) Exanthematum eruptio, sine symptomatum allevatione, sed calor cum aegritudine auctior.

27. Praeter maculas faciei ut supra insparsas reperi etiam priora symptomata, scilicet, diarrhoea, tussim, sitim ἀνορεξίαν somnolentiam, oculos stillantes, palpebras

tumentes, calorem satis intensum. Nihil aliud ordinavi nisi.—

R. Aq. Cardui Benedicti ℥ iii
Syr. caryophyll ʒ vi
capiat cochlearia ii mane et sero.

Decoctum pectorale sine scabiosa et hysop. pro potu ordinavi.

Sororula etiam hujus pueri, sesquiannum nata, eodem morbo laborans iisdemque per omnia a principio symptomatibus tentata erat. Nonus jam erat morbi dies, manibus corporeque jam evanuerant precedente die maculae, quae prius satis frequens has partes obsederant, relicta ex ruptae cuticulae reliquis asperitate in manibus majore in pectore minore et tactui solum perceptibile, quasi ex his partibus maculae subsidissent retroque in corpus se abscondissent, dum—in genis quasi in unum coalescentes rubicundiorem induerant calorem, fronte tamen menteque maculis plane vacuo. Haec infans ex quo recesserant pejor habuit, calidior erat, tussi sicca vehementi per intervalla corripiebatur et difficulter spirabat. Huic ut et fratri eadem prescripta remedia.

Observatio April 1670.

Hydrops. M. Clark, vir 30 annorum, circa finem martis corripiebatur tumore femorum crucrumque duro vestigia impressi digiti retinente. Huic sequens medicina ab Aesculapio (Sydenhamio?) prescripta. Bibat quotidie mane lb. ss. vini Rhenani in quo infusae sunt radices raphani . . . et succus absinthae. Prandeat carnes gallinaceas vel cuniculi. Pomeridiano tempore equitet aliquot miliaria, sexta pomeridiana edat frustrum solum panis, eat cubitum circa nonam, bibat in prandio lb. ss. cerevisiae tenui, nec quicquam amplius humoris spatio 24 horarum bibat praeter istam cerevisiam tenuem lb. ss. et vini medicati lb. ss. His per aliquot dies observatis, tumor multum decrevit, sed de siccitate faucium plurimum conquestus est et tandem circa 7 April vomitionibus correptus est, unde ad eliminandos humores in ventriculum regurgitantes praescripsi: Aquae Benedicti ℥i unde secuta est vomitio sed justo frequentior per totam istam diem sequentemque noctem, excurrens ita etiam ut sequenti die nihil retinere potuerit.

8°–9°. Ad reprimendam vomitionem injectus clyster, unde multa nigria foetida dejecit et post ejus operationem statim datur aquae menthae ℥i laudani liquidi gr. 24 et juleb perlarum, saepe sumend: ad comfortadum ventriculum. (2)

R. Aq. flor. borag. ceras. nigorum
menth. an ℥iiii
Aq. cinamomi hordeat: ℥ii
Margarit: pp. ʒii
Sacchar. cand. alb x m. fiat juleb.

Cum jam per tres horas cessaverit vomitio, et quies roburque ventriculo conciliatur, bibit acidulas Barnetenses cuilibet haustui superbibendo cochlearia 4 vel 5 aquae menth. ad cavendum vomitum. Acidulae copiose purgarunt. Sed jam recruduit iterum crurum tumor qui ab incepta vomitione prorsus evanuerat. 9°. Acidulas repetit.

10°. Sumpsit syrupi e spina cervin: ℥i unde purgatus est 16, cum magno levamine, et—siccitasque faucium valde molesta aliquantum remisit. Lingua enim a prima vomitione alba erat et sicca, et conquestus est de bolo in fauces subinde elevato qui suffocavit et somnum impedivit, cardialgia etiam plurimum toto isto tempore vexavit, vomitiones erant subinde porraceae.

10°. Observandum est in usu spinae cervinae quod in corporibus facile solubilibus et quae a pilulis cochiis vel colocynthide tormina non patiuntur, ℥i istius syrupi plurimum (aliquando ad sedes 20 vel 30) purgat, cujus frequens usus in hujusmodi corporibus ἀκαθαρτοῖς hydropsin sanat, etsi tumor partium hydropicarum hoc medicamine exantlatus saepe recurrat inter biduum vel triduum, toties semper eadem medicamine amoliendus donec tandem perfecta valetudo consequatur. In difficilioribus vero corporibus et quae a sumptione pil. coch:

tormina patiuntur syrupus e spina cervina nihil prodest ad curationem hydropis, cum leviter nimis et inefficiter operetur. Post aliquot dies, cum hic aeger ex opinione pharmacopolae nimium docti ulteriorem pergationem non admitteret, sed hepatica postularet nec ulterius medico obsequeretur, mortuus est.

1670. May 12°. M. Litchfield, virgo, 14 annorum, levi horrore et rigore correpta est, quem postea secutus est dolor levis sinistri femoris cum tumore ejusdem cruris. Dolor ita sensim ingravescebat ut inter triduum omnino ambulare vel pedem sine vociferatione extendere non potuerit, crure infra genu simul intumescente sine rubore. Circa idem tempus extuberantia aliqua in facie et corpore eruperunt, calor naturali paulo intensior, lingua parum alba. Ex his conjecit medicus esse speciem . . . febri erysipelatosa.

M. M. Venesectio brachii, et pedis affecti lateris sequenti die. Purgatur unguento dialtheae topice, sed postea cataplasma ex pane, lacte, et croco quod magis profuit, et per triduum a purgatione sudatio ex posseto salviato, unde multo melius habuit, et deambulare iterum coepit, sed statim a purgatione dolor femoris cessit . . . in poplitem—visus materia erisipelatosa eum in locum collecta. Sed recruduit iterum dolor. unguentum dialtheae et fotus applicantur et sudor bis—unde melius habuit. Sed non perfecte convaluit et impatiens ab aliis medicis tractata est.

Observatio Jan. 69–70. Erysipelas. (Hujus historia initium deest) Hora somni sumpsit sequens hypnoticum cordiale ad refocillandos vires somnumque conciliandum.

R. Posseti vini albi
Croco in nodulis leviter tinct. (?) ℥iiii
Succi lujulae ʒvi

……

Sumpto hoc hypnotico quietem sed insomnem noctem transegit, et ad interrogata obstinata taciturnitas. Levis nocte mador sed sine levamine.

4°. Mane vehementer deliravit valde garrula.

R. Margarit pp. ʒii
Aq. ceras: nigr.:
Aq. papav. erratici an. ℥vi
Aq.—pid. ℥ii
Sacchari tabulati .℥i

Capiat ad cochlearia 7 post bolum sequentum, et deinceps ad placitum.

R. Concerv. lujulae ʒii
Theriaca Andromachi ʒss
Diamargarit. frigid: gr. v
Lapid bezoar . . . gr. v.
cum s. gr. syrupi de succo citri.

Fiat bolus, capiat paulo ante meridiem cum 7 cochleariis aquae praescriptae. Unde secutus est definitus mador sed sine levamine, perstitit enim delirium, et quia suspicio erat hysterici delirii fumus tabaci insufflatus est, unde paulo melius habere visa. Sed lucida ex hoc fumo intervalla admodum brevia erant. Hora 4ta pomeridiana ad supprimendos vapores hystericos administavi. (?)

R. Galbani ℥ss.
— camabac ʒii
Misce, fiat emplastrum

R. Gossipii oleo buxino imbuti nodulum, admoveatur umbilico superponendo emplastrum prescriptum sed sine affectu.

Vesicatoria nucae et tibiis . . . loco cataplasmatis solum linamentum prescriptum. Nox delira et inquieta sed aliquando quies (an vero dormivit conjectura tantum observatione non constat) Nihil sumpsit praeter cerevisiam tenuem oleo vitriolato acidulatam. Pulsus celer, debilis, aequalis, uti per 2 precedentes dies urina prope sanorum.

8. Mire et audacter delira, ita ut medicis jam visa sit esse mania hysterica; toto mane garrula et clamosa.

R. Rutae manipulos ii
. . . halec . . . i

Saponis nigri	℥ii ss
Micae panis secalini	℥ii
Aceti vulgaris	(q.s.)

Misce, fiat cataplasma plantis pedum applicandum. Circa horum primam pomeridianam sequentis, subortus est . . . sudor unde circa sextam delirium cessavit et ad saniorem mentem rediit continuato sudore. Pulsus celer, debilis, aequalis, lingua plane sanorum et urina pene naturalis cum sedimento mediocri. Per totem hanc diem nihil sumpsit praeter cerevisiam tenuem olio vitriolato acidulatam, et post longa intervalla parum avenacea. Continuatus sudor usque ad horam quartam cum euphoria et subinde somnus quietus. Potus cerevisia olio vituolato acidulata.

6. Mens sana, pulsus celer, debilis, renovatum plantis cataplasma. Injectus clyster unde tres vel 4 sedes cum euphoria. Per totam hanc diem sermo satis compositus nisi quod aliqua subinde acuratius observanti turbatae adhuc mentis apparuerint indicia. Potus cerevisia acidulata, victus tenuis, brachium ab erysipelate prorsus liberatum, somnus nocturnus 5 vel 6 horarum interpolatis vicibus, pulsus ut prius . . . dieta ut prius tenuior.

7. Omnia satis recte nisi quod aliquot inconstantis adhuc animi et levi impulsa turbatae mentis indicia, cetera ut prius. Nona hora sponte dejecit, secunda pomeridiana surrexit cum levamine, sexta ivit cubitum et nocte vacillantis adhuc animae vestigia quod ex sequente haustu cordiali suspicio erat.

R.	Discorid:	ʒi
	Succi lujulae	℥vi
	Aceti alb.	℥i
	Syr. Caryophyll	℥ss.

8. Recte habuit, et injectus et clyster cum euphoria.

(Reliqua deinceps prosequemur)

Gonorrhoea virulenta. Jan. 7 N. 30 circiter annorum his symptomatibus affectus est. Frequens ardor urinae et ad mingendum irritatio precipue post primum somnum; urina varia, sed quando pallida dolorem et irritationem maxime sentit. Semen per 4 vel 5 dies retentim emittitur partim coagulatum in granula oblonga dilute flavescentia quod in ipsa ejaculatione puncturam efficit et dolorem. Cum etiam urinae ardore vexatur emissa urina aliquid seminis plerumque admiscetur et erectione plerumque comitatur mingendi desiderium. Post primum somnum sicco volarum plantarumque ardore vexatur, qui, si lectum non deseret, levi istarum partium madore plerumque solvitur. Dolore circa ischiam saepius dextram, aliquando utramque patitur, presertim vero nocte inter cubandum uti interdui post diuturniorem deambulationem.

R.	Pil. coch. major	ʒi
	Calomel	ʒss.
	Resini Jalapae	gr. xv

Cum s. q. terebinth. venet. Fiant pilulae no. xviii.

Capiat 6 mane cum regimine, superbibendo haustum sequentum.

R. Aq. paralyseos, nymph. āā	℥ss.
Syr. de nymph	ʒiii

Misce.

Ex his recte convaluit.

Morbilli. 7 Mart. 69–70. W. Sydenham (magni Sydenhamii filius) puer 11 annorum, tenera admodum textura ex natura, pulmones debiliores et tussi valde obnoxius, corripiebatur horrore et rigore cui successit calor praeternaturalis sed levis. Defluxio narium, somnolentia, tussis, anorexia.

4°. Rigor et horror et omnia haec symptomata quotidie aucta usque ad diem quartum, lingua etiam 4 die valde alba et sicca, alvus naturalis sed febris auctior et difficilis respiratio circa primos dies solito frequentior, et vomitus.

5°. Vesperi aparuerunt aliquot in fronte genisque parvae maculae rubrae instar pulicum morsus et reliqua omnia symptomata aucta, praecipue somnolentia, defluxio cessat.

6°. Per totam faciem maculae rubrae figurae incertae pustularum minimarum rubrarum supra superficiem elevatae, cum aliqua faciei aspritudine tactu perceptabili, faciem totam decolorarunt, et totam corpus maculae rubrae satis frequentes invaserunt. Calor praeternaturalis, pulsus valde celer. Tussis, cum excreatione satis difficile materiae mucosae, dyspnoea gravis, oculi teneri et udantes, labia tumescentia; anorexia omnimode lingua alba sicca, sitis modica, sedes duae. Regimen refrigerans, surrectio, potus aqua hordei.

7°. E fronte evanescere coeperunt maculae, et circa noctem etiam paucae et languidae in tota facie relictae. Somnolentia et tussis remissior, oculi teneri, labia arida et tumefacta, lingua alba non sicca, respiratio liberior, calor moderatior, pulsus celer, anorexia, omnimode, alvus ter liquide soluta, sitis nulla, defluxio narium nulla, vivacior, potus aqua hordei et decoctum pectorale, regimen frigidum, surrectio.

8. Maculae in vultu nullae, in corpore evanescentes, tussis crebrior et siccior, nam quod ante tussiendo excrevit non tam huic morbo deberi videbatur quam tussi qua ante invasionem morbillorum laboravit et laborare consuevit. Oculi teneri, oculorum nariumque defluxio, somnolentia aliquatenus sed minor, lingua alba sed minus arida, respiratio liberior, pulsus celer, sedes una liquida, anorexia minor, dolor circa ventriculum mitigatus qui pridie vexaverat, calor praeternaturalis . . . urina sana vel sana pallidior. Potus aqua hordei et precipue decoctum pectorale sine hysop, et scabios. Victus tenuissimus et *ἀσαρκος* surrectio, regimen refrigans.

9°. Maculae omnes de toto corpore deletae, calor naturalis, pulsus celer, defluxio narium et oculorum, oculi teneri, lingua minus alba non sicca, tussis sicca crebra, medicatio eadem.

10°. Oculi teneri, sed oculorum deflexio nulla, nulla somnolentia, respiratio difficilis, tussis molesta, calor praeternaturalis auctior, quae symptomata inde . . . videbantur quod tantillum carnis pulli comederat. Lingua alba, pulsus valde celer, alvus naturalis.

11°. Oculi minus teneri, respiratio non plane liber, tussis molestior hora 4ta pomeridiana praecipue ingravescens et nocte molestissima, lingua alba, pulsus valde celer, appetitus fere nullus, sitis nulla. Regimen idem.

12°. Omnia eadem, facies etiam Hippocratica et tussis aucta. Vespere venesectio ad ℥ vi, unde eadem nocte mitigata tussis.

13°. Oculi melius et prope confirmati, respiratio liberior tussis mitigata, calor adhuc praeternaturalis, pulsus celer, lingua multo minus alba, alvus naturalis, appetitus pene nullus, nec sitis plus quam sana, vultus vivacior et in aere illibato et frigido minus urgit tussis, defluxio aliqualis narium iterum rediens.

Cum symptomata haec ita a venesectione et aere frigido mitigantur quaerendum annon recedentibus maculis per quas morbi materia non sufficienter evacuatur, latens in sanguine calor tussim et reliqua mali omnia symptomata efficiat, qui venesectione et refrigerantibus et aere libero et aperto quantum potest supprimendus?

Etiam an purgatio hoc in casu quicquam efficiat cum viderim a macularum recessu diarrhoeam per 14 dies supra satis vehementer perseverasse in infante annorum 12 sine levamine caloris?

Q. Annon tussis haec sit levis peripneumoniae cum sit plerumque sicca sine omni vel saltem notabili *ἐκκαθαρση*?

Q. Cruor emissus partem coccineam valde fluidam habuit et minus saturam palloremque quam in cruore alias observavi, et inequali superficie hinc inde disrupta vel depressa crassumentâ nigra (?) superstratam. An hoc sit perpetuam in hoc effectu vel similibus, vel ex alia aliqua causa accidentem?

14°. Omnia meliora, et tussis sensim intermittens, circa 21 diem evanuit. Aeger aerem apertam frequentens convaluit, 11° Aprilis purgatus est.

Q. Whether those that vomit in the beginning of the measles have during the progress of that disease a diarrhoea or not? Since looseness is sometimes violent enough which accompanies it, or whether it be only in those children which are breeding of teeth?

Q. Whether a dry tongue be not a prognostick of the increase of the cough and the fever which comes on about the 8th day?

Observationes March 1669 (70).

Quartana. T. Kirby, vir—annorum, precedenti autumno quartana correptus est. Circa initium morbi venesectio et alia incassum tentata, perseverante usque ad initium Martis febre non omnino mitigatis paroxysmis. Ego consultus 3 Martis hoc ordinavi.

R. Rad. lilii albi, altheae an ℥i
Fol. altheae, malvae, verbasc, summitat.
Hyper. an manipulum i
Semin. lini, fenugr. an. ʒi

Cocque cum s. q. aquae communis ad lb ss. Colatura dissolve syrupume quinque radicibus ℥? pro tibus dos. Sumend. crastino die, horis medicinalibus. Repetatur per 9 dies continuos.

Hoc cum per novem dies sumpserat nullo interim observato victus regimine invasit duplicata febris et sic per duas vices perstitit, paroxysmis scilicet 4 in 6 diebus perpessus est, quibus finitis protinus evanuit febris.

Q. An ex vi medicamenti vel tempestati?

Q. An reduplicatio quartanae circa aequinoctiam vernam vel alio quovis tempore sit mox abiturae febris signum.

June 1670.

Febris inflammatoria. 26°. Jun. Larke, juvenis sanguineus plethoricus 18 annorum corripiebatur horrore et rigore non valde intensis, deinde secutus est calor, dolor capitis mediocris lumborum intensus, sitis et subinde sudor copiosus sine levamine, presertim se offerebat sudor in lecto et post potum cerevisiae tenuis. His comitata symptomatibus invaluit febris usque ad 30° Junii.

5. 30°. Junii consultus suasi venesectionem ad ℥x. Chirurgi moderatione demptae sunt ℥ix, unde majis incaluit uti fieri solet in febribus plethoricorum quibus mole sanguinis diminuta et ventilatione facta intensius flagrat (?) incendium. Lingua erat alba et humida, nullus circa scrobiculum cordis et pressura manus dolor, sed petechiae in pectore apparuerunt et lumborum dolor satis intensus.

Hora 9° vespertina injectus sequens clyster.

R. Decocti communis pro clystere lb i
Sacchari rubri ℥iiii
Elect. lenitiv. ℥ii
Misce, fiat clyster.

Ex hoc 5ies vel 6ies dejecit. Nocte parum dormivit in sudorem propensus. Vomuit et haemorrhagia narium.

6. 1 Julii. Mane, pulsus uti prius celer et altus, calor intensus, lingua alba scabra ad siccitatem fuscam inclinans. Venesectio iterum ad eandem quantitatem. Serum lactis et aqua hordei pro potu ad libitum permissa.

R. Salis prunella ℥i ss.
Sacchari cand. ʒvi

Misce, fiat pulvis subtilis, dividatur in chartulas ʒi continentes.

Capiat unam ter vel quater in die in haustu seri lactis.

R. Aq. portulac. lactuc. nymph.
paralyseos, an ℥iiii
Syrupi de limon ℥i ss.
Syrupi viol. ℥i

Misce, fiat juleb. Capiat ii vel iii ad libitum.

Q. Cum hic annus constitutionem nactus esset morbillosam, annon haec febris hujusmodi constitutionem comitetur, cum morbillis etiam petechiae sunt familiares si regimen adhibeatur validuisculum? Vel forte febris haec cognationem habet cum variolis fluxisque (?) comitante doloreque lumborum ex inflammatione utrumque affectum producente?

Ex clystero pridie injecto 7ies vel 8ies dejecit et toto etiam hoc die procedente alvi profluvio 10ies ad minimum. Babit toto hoc die lb ii circiter seri lactis, et cum usque ad vesperem perseveraret lumborum dolor ex permissu medici bibit ¾ lb frigidae, unde statim plurimum mitigatus est lumborum dolor. Sanguis hoc mane detractus erat pleuriticus, alba membranula tectus. Lingua alba scabra, non autem omnino sicca, dolor capitis nullus, nox insomnis, calor nocte admodus.

7. 2°. Mane, pulsus celer et altus, calor intensus, lingua alba scabra, dolor regione lumborum persistens, vomitus, haemorrhagia narium. Interum detractus est sanguis ad ℥x vel xii, bibet lb i frigidae cum allevatione doloris dorsi et ἐυφορια. Vespere injectus clyster etiamsi precedente parte diei 4 vel 5 dejecisset. Ex injecto clystere semel mota alvus, lingua parum nigricans, ex epoto lb i frigidae as albetudinem restituta, et dolor dorsi imminutus. Nox insomnis et urens (?) cum levi circa diluculum sudore et haemorrhagia narium.

8. 3°. Calor, dolor dorsi post insomnem noctem satis gravis, haemorrhagia narium iterum, et iterum venesectio ad ℥x. Cruor pleuriticus, duo per intervalla injecti clysteres cum doloris allevatione. Lingua nigricans scabra et sicca, potus aqua hordei cerevisia tenuis. Hora somni sumpsit Aq. paralyseos ℥ii. Syrupi de meconio —? Nocte somnus subinde interruptus nec valde profundus.

9. 4°. Pulsus celer, calor acutus, lingua scabra fusca et justo siccior, dolor dorsi aliquando remissior. Bibit, hortatu medici, haustum frigidae unde statim melius se habere fassus est et nigredo linguae aliquantum statim imminuta. P. M. injectus est clyster, et hora 4ta in tantam narium haemorrhagiam se effudit sanguis ut ad 6 vel 7 effluerit, nec cessavit donec detracta tunica nudatis usque ad indusium fieret. Vespere alter injectus clyster et hora somni sumpsit narcoticum 8 die prescriptum. Nocte somnus interruptus et turbatus. Hoc die crusta labiis adnata seperabantur, unde salutis spes concipi coepta.

10. 5°. Calor multum imminutus, lingua prope naturalis et melius habuit nihil actum nisi quod haustum bibit aquae frigidae et poma cocta comedit et cerasa acidula. Nocte aliquantum auctus calor ob intermissum clysterem. Somnus nec multus nec quietus.

11. 6°. Mane injectus clyster. Calor moderatus, pulsus celer et satis fortis, lingua fere naturalis. Ex injecto clystere 5ies dejecit. Dolor dorsi molestus et iterum haemorrhagia. Edit . . . et cerasa pauca cruda. Potus cerevisia tenuis. Nocte somnus nec multus nec omnino deficiens.

12. 7°. Justo calidior sed non valde ardens, lingua fere naturalis, dolor dorsi nondum plane sopitus. Ex injecto clystere 4tere dejecit . . . deliravit nocte. Quies moderata, sumpsit sequentem potionem Aq. papaver, rhoead. ℥iiii. Salis prunellae ʒi Syr. viol. ʒi.

13. 8°. Justo calidior, pulsus celer, dolor dorsi pene evanuit, lingua naturalis, ex injecto clystere bis dejecit.

N. B. cum maxime ardebat febris sordes nigricantes dentes incisores precipue obtegebant quae circa nonum diem una cum febre imminuebantur et circa hoc tempus, gliscente iterum paululum ardore alternum (?) dentem iterum obtegebant. Bibit frigidam cum fructu, et potionem bibit ex aqua papav. rhoead. ℥iiii, sal. prunellae ʒi, syrupi violarum ʒi.

14. 9°. Injectus clyster cessavit dolor dorsi sed pulsus celer et calor praeternaturalis adhuc perseverarunt et paulo post mediam noctem liquida dejecit et mente leviter turbatus est, quam haemorrhagia pauca secuta est, auctusque calor. Bibit aquam papav. rhoead. cum sale prunella.

15. 10°. Venesectio ad ℥viii, unde melius habuit. Potus cerevisia tenuis et aqua hordei, nulla per totam diem sedes; somnus interdiu frequens et brevis, nocte sumpsit narcoticum, lingua sicca et alba,

pulsus celer et equalis, velicatio rara tendinum in carpis, respiratio libera, lenta et aequalis, calor plerumque acutus.

16. 11°. Cum ita aestuavit aer et in coenaculo decumberet ut nullo modo nec venesectione nec refrigerantibus temperari poterit saeviens calor, sed ab aestuante coelo perpetue accenderetur, et in pejus omnia, per cardiaca et sudationem materiem febrilem evacuare conatus est medicus, itaque dedit.

Aq. theriac. still.	℥ii
Theriac. Adromachi	ʒss.
Elect. de ov.	℈i
Syrupi caryophyll	℥i

Hoc cardiacum et fortiora praescripta unde sudor provocatus sed sine fructu, nam omnibus in pejus ruentibus tandem fatis concessit:

N. B. Etsi per totum morbi cursum plurimum circa caput et superiora sudavit, inferiora tamen praecipue pedes nunquam sudore perfusi sunt quod mali erat ominis.

Nephritis. E. Grig, virgo 25 annorum corripiebatur dolore acuto circa regionem lumborum, qui se protrudebat versus umbilicum et ut ipsa dixit quasi cingulum corpus circumdedit, aderant etiam vomitus et nausea cum ardore urinae.

22.° Julii. Ex suasu pharmacopolae duo injecit sunt clysteres sed sine fructu. Vocatus ego venam secui ad ℥x. unde mox doloris et symptomatum remissio, et calculi friabilis ad magnitudinem seminis coriandri excretio cum sabulo rubro tenui multo. Injectus est etiam clyster ex emollientibus et lenitivis, et haustus refrigerans ex aquae parietariae ℥iiii, Syrup. viol. ℥i. ol. salis prunellae ʒi propinatus. Jussa etiam est possetum in quo radices altheae incoctae sunt copiose haurire. Victus ἄσαρκος, potus aqua hordei. Remansit per paucos dies calor levis praeternaturalis circa renes, sed hac observata per paucos dies victus ratione convaluit.

Ardor urinae perpetuus, (Sanguria) Mulier quaedam post 3 vel 4 annos continuo et intolerabili dolore circa vesicam et collum vesicae praecipue cum urinam redderet cruciata est, ut lecto surgere minime potuerit. Saepissime urinam reddidit sed paucam et cum dolore atroci ita ut vocifaretur. In fundo urinae post aliquam moram subsidere solebat sedimentum album crassum et purulentum. Tandem doloribus cruciata et confecta interiit. Apertum cadaver ostendit vesicam, uterum et intestinum rectum ita adnatos omniaque peritoneo ita tectos et pelvis ossi obligatos ut nec vesica nec uterus expandi potuerit, hinc factum quod numquam conceperit, urinae copiam vesica continere non valerit et cum alvum deponderet assuetos vesicae pateretur labores. Dexter autem ren plurimum intumuit, repletus scilicet et exesus pure multo fetidoque ex abscessu antiquo; hinc factum ut conqueretur de dolore dextri lateris, nec in dextro latere potuit decumbere. Dolor jam olim in rene dextro inceperat et postea in vesica terminatus est ibique ad mortem perseveravit. Periti aliquot medici eam calculo vesicae laborare audacter pronunciarunt. Verum fomitem mali in rene haerere conjicio, illic enim cum abscessu incepit dolor, sed pus per ureterem sensim in vesicam emanans acrimonia sua acutos istos dolores excitavit et cum urina excretum in urina subsidit. Huic conjecturae hoc insuper favit, quod insertio ureteris dextri in vesicam orificium habuit patibulum et annicularis digiti pene capax.

Colica. Aug. 4°. 1670. Ellen Allen, virgo 27 annorum, violento dolore intestinorum corripiebatur, post horrorem et rigorem. Nihil excrevit nec sursum nec deorsum sed intestina contrahi comprimique sibi visa sunt cum dolore acutissimo. Nox secuta insomnis ob dolores continuos cruciatus.

5°. Eodem modo se habuit. Pomeridiano tempore vocatus cum lac lunae parari non poterat et quia incaluit, venesectionem jussi ad ℥viii,—sanguis floridus. Clysterem etiam lenitivum sine purgantibus injici curavi sed sine quovis fructu. Nox in tota insomnis et torminibus plena.

6°. Mane bibit lac lunae usuque ad vomitionem saepe repetitam, et injecti interim 8 clysteres ex diluto appropriato (?) Cum post multas vomitiones adhunc perseveravit dolor nec dum ad urinae vias quicquam transisset, jussi ut, omissa repletione, biberet tantam eam quantitatem quam ventriculus retinere potuit, nam maxime repletum est et intumuit abdomen, verum quum primum urinam reddidit equidem remiserunt dolores et sensim convaluit. Etsi vero antea plures ex injectis clysteribus sedes habuit, nihil omnino minxit. Hoc methdodo (?) consumpti sunt lactis lunae congiarii 4.

Q. Annon solum hinc cessant dolores cum lac lunae transit eo quod tum mixtum sanguini humores acres contemporaverit secumque avescerit?

Q. An venesectio vel sal-prunella vel quicquam aliud huic transitui conferat?

Q. Annon idem facilius peragatur si in hoc casu cum hauriatur quantitas quae ventriculum abunde replenat, ad vomitum vero non stimulet, cum hoc in casu noxii humores ventriculum non occupaviunt nec elotione opus est?

Inter 4 horas a prima potione cessarunt dolores et labore fessa post finitam ultimi clysteris operationem lectum adiit, ibique per 24 horas decubuit, sudore non admodum violento qui sponte supervenit indulgens, nihil bibit comeditve praeter lac tepidum. Jussi ut per alterum adhuc diem intus se contineret, eandem observans dietam, exiit tamen bibitque cerevisiam tenuem unde levis rediit intestinoeum dolor. Perfecte tamen sine ulteriore medicatione convaluit.

Abortus. 19°. August. Domina D. Ashley—annorum, sanguinea et plethorica satis 19°, mane, finem 12ae septimanae a conceptione, subitam ventris observavit intumescentiam sine tamen omni dolore vel aegritudine aut quavis alia in corpore mutatione.

20°. Vespere subitum sanguinis fluidi fluxum copiosum ex verendis sensit absque omni dolore, qui fluxus statim substitit et subinde paulum erupit. Venesectio statim. Post duas horas a venesectione excrevit sine dolore membranam tenuem cui adnascebatur quasi imperfecta caro vel parenchyma, et videtur pars secundinae. Tota hac nocte nec dolor nec fluxus quicquam. Cetera omnino sana nec venter nec ubera detumuerunt. Ex consilio medici nihil actum sed omnĩa naturae permissa usque ad diem 23. Nec amplius fluxus cujusvis quicquam apparuit, sed tunc demum ad refovendum uterum foetumque praescripta est Aq. exgerminibus quercus ad ℥viii bis in die sumend. Haec tandem debito tempore peperit filium vegetum et formosum 26 Feb. sequentis anni hora 8a p.m.

Febris. J. Grig, vir 32 annorum, mense August . . . multas instantis morbi habuit cum doloribus corporis vagis.

19°. Curru vectus est 2 diebus Bristolio Londinum et his diebus febre laboravit.

21°. Male habuit cum ardore satis intenso.

22°. Febris. Injecto clystere ex lacte et syrupo violarum bis ve ter dejecit. Ea nocte tormina, et proxima mane dejectiones frequentes liquidae. Juleb cordiale potat pro languoribus.

23°. Alvi profluvium, venesectio, et postea purgatio ex infusione rhabarb. unde purgatus est cum euphoria. Nocte paregoricum.

24°. Iterum purgatus est cum bolo ex rhabarb. satis recte, nocte paregoricum et nox satis quieta.

25°. Emulsio refrigerans, febris nam satis intensa, et gargarisma ad oris siccitatem et sordes.

26°. Eadem omnia et febris ingravescens.

27°. Lingua sicca et nigricans igitur gargarisma magis refrigerans. Laxitas alvi, et nocte delirium suppressa alvo. Adhuc autem quotidie surrexit. Nocte hypnoticum cardiacum, et juleb cardiac., et vesicatoria brachiis. Omnia in pejus, nox tamen quieta.

28°. Juleb magis ex vinosis et sequens gargarisma, quod valde placuit.

R. Aq. frag. plant. et ros. rub. an ℥vi
Syrupi Rubi Idaei ℥ii
Misce, fiat gargarisma.

Nocte hypnoticum idem. Nox delira et insomnis. Vesicatoria tibiis et juleb refrigerans, et potio cardiaca.

29. Clyster lavans, juleb idem et potio cordialis. Vesicatoria pone aures et cataplasmata . . . Febris ut prius, delirium auctum, hypnoticum repetitum sed sine fructu.

30. Juleb et cardiaca ut prius sed nequicquam.

31. Hoc die . . . sudor universalis per 2 horas sed evanuit sine fructu, etiamsi bolo ex dioscoridio bis repetito et haustu cordiali promovere tentatum est.

Sept. 1. Juleb cardiacum, nox insomnis. Hora 6ta matutina 2 Sept. expiravit. Vir optimus.

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* These books and papers have been freely consulted in the preparation of this biography of John Locke.

THE ORIGIN OF THE UNIVERSITY OF BOLOGNA

By GUISEPPE FRANCHINI, M.D.

MODENA, ITALY

THE fall of the Roman Empire, which had reached a very high degree of civilization, determined the complex phenomenon of civil decadence that found favorable development in Christianity's teachings of renunciation.

The Dark Ages followed, during which hordes of hungry and bloodthirsty barbarians took advantage and invaded Italy, being attracted by its temperate climate and the opulence of the fields. Goths, Huns, Vandals and Longbards, descended from the northern steppes, and made of Italy a battlefield of passions and plunders; they were real barbarians, not in the strict Latin meaning of the word, but because of their lack of every form of civilization. This *flagellum Dei* (scourge of God) was in open contrast to the Latin domination over Hellas and the Hellenic occupation of the Pharaonic Empire, where the conquerors were won by the civilization of the subdued people. In their case, literature and the arts flourished, and found, through the new rulers, not only greatness but further impulse toward progress.

While the Ptolomeys, succeeding Alexander the Great, were creating a cultural center in Alexandria of Egypt, the northern barbarians were scouring the peninsula with constant conflagrations and plunders. Whatever part of the immense Greek-Roman intellectual patrimony we now possess, we owe to those who still burning with the sacred fire of the imperial civilization, met secretly in churches and monasteries or in secluded woods, and kept their culture alive. It is, however, well known that Theodoric, king of the Ostrogoths, though he himself could not read or write, protected Cassiodorus, Ennodius and Boethius who cultivated the study of Roman literature, while he himself took pride in erecting magnificent edifices.

At Bologna, the "School," so-called for lack of a better term, was established at the initiative of a few cultured men; it was entirely private, without any control of the princes who, given to warfare, despised any and every form of activity foreign to military affairs. Literature was not considered an occupation fit for a man of the world and consequently, it could be pursued only by the clergy. Since everything centered in theology, scholars shut themselves up in the inviolable recesses of religious communities where peace and security turned their minds to meditation. Abelard's and Friar Benedict's schools at Troyes originated in this way. The Cenacle of Montecassino in the fifth century, the first example in Italy perhaps, of organized study with magisterial direction, closely simulated the Justinian school of law. Saint Benedict's cenobites did not disdain to teach the medical art, being possibly the forerunners of the famous teachers of the Salernitan School. In the year 802, Charles the Great, in the first Imperial Edict, made of Salerno already a well-renowned school of medical disciplines, the best known center of education. This edict was the only one of its kind until four centuries later. Dante reminds us that Parisian schools were confined to *vicus straminis* (Straw Street) where teachers and pupils sat on straw in curious places in which *in parte superiore magistri legebant, in inferiore meretrices officia turpitudinis exercebant* . . . and *inter se et cum biminibus litigabant* (on the second floor teachers lectured and on the first prostitutes practiced their obnoxious business . . . and wrangled with men and among themselves).

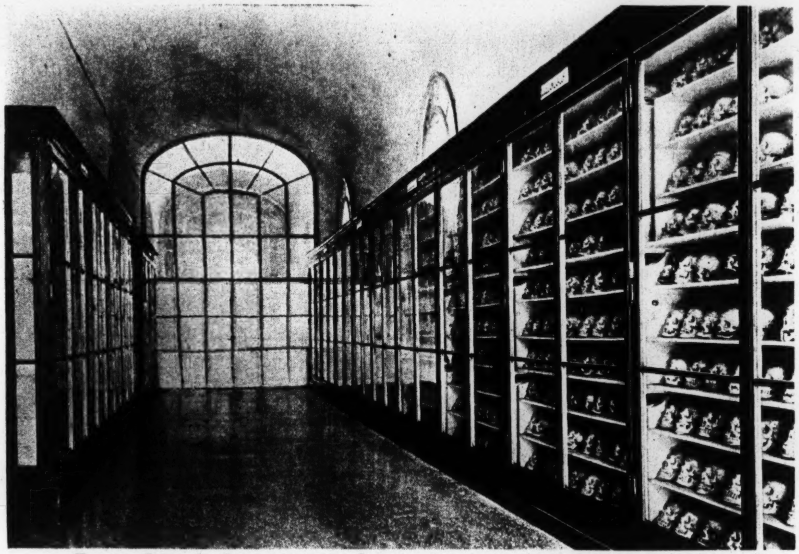

FIG. 1. COLON'S COLLECTION OF SKULLS, INSTITUTE OF ANATOMY, BOLOGNA.

THE STUDIO OF BOLOGNA

Bologna did not enjoy any greater privileges. Here, as elsewhere, teaching began as a private initiative and Odophredus cites *quidam dominus Pepo* (a certain Sir Pepo) who *cepit auctoritate sua legere in legibus* (began with his authority to read in the laws), and was soon followed by Yrnerius with the same teaching. In the year 1000, as H. Rashdall reminds us:

> . . . the professor was not originally the officer of any public institution: he was simply a private-adventure Lecturer—like the Sophist of ancient Greece or the Rhetor of ancient Rome—whom a number of independent gentlemen of all ages between seventeen and forty had hired to instruct them.

The School of Bologna, thus formed, developed and flourished as a private institution, not however lodged in ill-famed houses, as in Paris. In the fifteenth century we find artists studying in different places from lawyers; the use of straw, far from being banned, must have been usual, since as late as 1405 it served the students as an argument in favor of anticipating Christmas vacations which were demanded *proiciendo paleas vel faciendo aliquem actum per quem impediatur doctorem legere* (by throwing straws or by doing some other act to prevent the doctor from lecturing). To this same year (1405) belongs the first edict of the College of Medicine and of Arts that prohibited lecturing in other localities than those expressly indicated and listed, in the vicinity of which no noisy business or profession could be carried on. Students paid the teacher a fee *pro suo salario et collecta bancharum* (for his salary for collecting funds) and were brought together in hospices or colleges where, through statutory provisions going back to the year 1284, they enjoyed every sort of privilege and protection. The hospitality offered students and their respective families by the City governments was generous indeed, and it aimed at making possible for the University a more vigorous growth *ut tesaurum preciosissimum* (as a very precious treasure). It was lawful for teachers to board students, but severe penalties threatened them, when they violated the duties of hospitality or lectured in another school.

FIG. 2. PORTRAIT OF PROF. MANZALINI, INSTITUTE OF ANATOMY, BOLOGNA.

Unlike the other European Universities, the students of Bologna were distinguished by their maturity and prosperous circumstances. The elect youth of Europe convened in this city. It is estimated that no less than 10,000 German students were enrolled there between the years 1289 and 1796, at a time when such University institutions were not yet known abroad, and teaching was imparted only to the wealthy who could allow themselves the luxury of a preceptor.

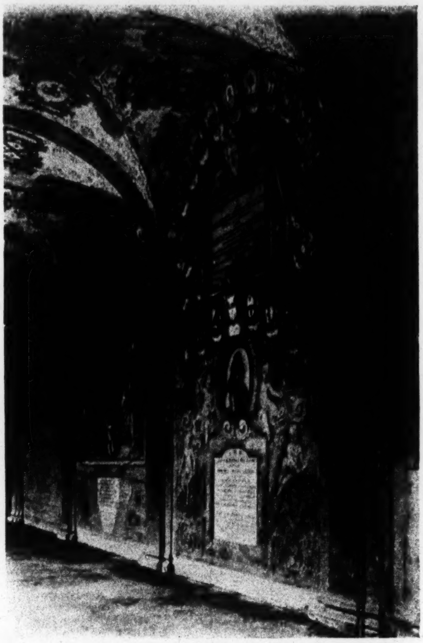

FIG. 3. VALSALVA'S CENOTAPH IN THE PORTICO, SECOND FLOOR, ARCHIGINNASIO BOLOGNA.

In the fifteenth century every Italian city had very flourishing Superior Institutes, while in northern Germany the first elementary schools were timidly beginning to appear. For this reason the flower of German nobility and talent, among whom the highest prelates, the greatest princes and literary men, drew from Italy and from Bologna the solid cultural foundations that kept alive the torch of their knowledge, deepest redress of the oppressed against the bloody arrogance of the conquerors.

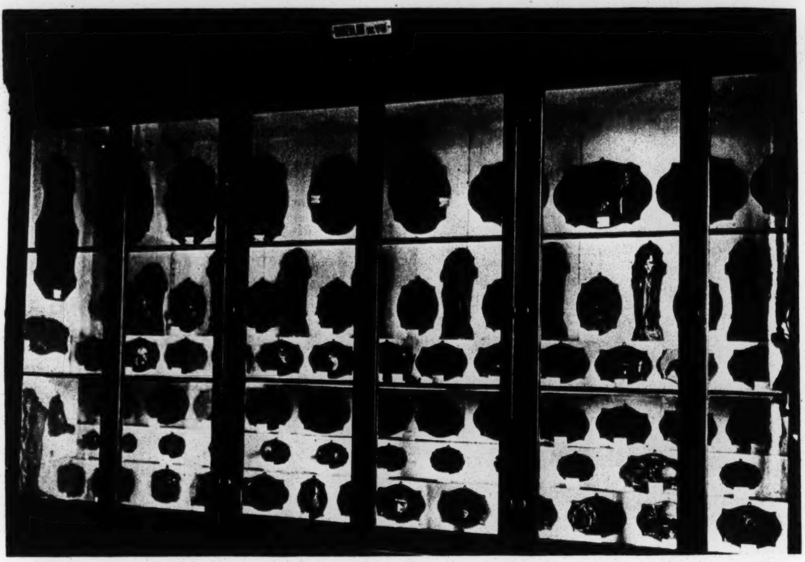

Fig. 4. Collection of Manzalini's Anatomical Preparations, Institute of Anatomy, Bologna.

Students grouped themselves in associations, each having a leader according to their country of origin, (*Universitates scholarium*). Citramontani (living this side of the Alps) the Italians were called and Ultramontani (living beyond the Alps), the foreigners, who were subdivided by nationalities, each having their respective *Consiliarii* (Advisers). In turn, among these nationalities, a Rector was elected who had civil jurisdiction in controversies, conferred with the City magistrates, elected the Lecturers and provided for their compensation and for school-books, which were purchased or rented from the *Stationarii* (stationers).

The audience was often so numerous in Bologna as to justify the order given to the Lecturers in 1474, as they did in Siena, to assemble and debate in the Public Square. A statute of 1378 ordered *quod nullus possit legere de mane Medicinam nisi Bononiensis verus* (that no one but a thorough bred citizen of Bologna could teach Medicine in the morning), and this provision was obeyed till 1459, when it was revoked. Other ordinances prescribed the ordinary and the extraordinary lecture-books and hours with the view of having the forenoon reserved for ordinary subjects. For the extraordinary lectures, given in the evening, only students could be employed who were duly chosen and salaried by the City which, with the statute of 1410, assumed also the burden of the salary for the Lecturers selected by the Faculty College, provided that they were of Bologna.

This is the first step toward State control and official recognition of the School which, from a free and private institution was thus changed into a

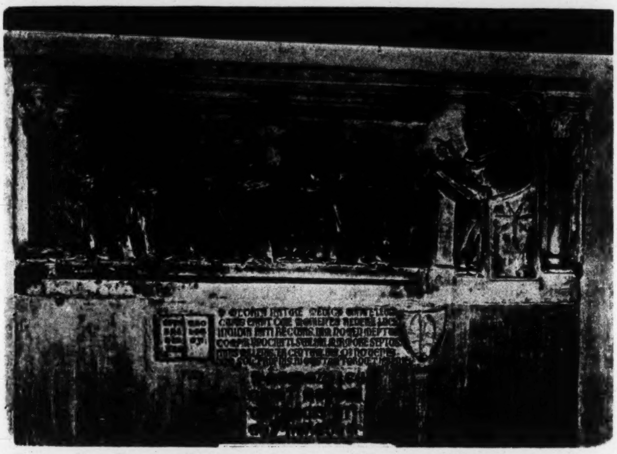

FIG. 5. BAS RELIEF REPRESENTING THE MONDINOS, FATHER AND SON, FAÇADE OF S. VITALE CHURCH IN BOLOGNA.

dependent official organization. The last to receive proper legislation were the school-buildings, an indispensable necessity for the teaching of medicine, if not for letters and law. Practical anatomy, at least, required special places for the keeping and dissection of the bodies. The task of providing for such a civil need was indeed not an easy one: ignorance, sentimentalism and religious fanaticism were jointly opposed to it. The earnest students, in retaliation, organized veritable punitive expeditions snatching, carrying off, exhuming and mutilating bodies.

In the year 1727 in Bologna a comic note was not wanting in this perplexing situation: Vesalius was represented contending with dogs and vultures over the remains of executed criminals at Montfaucon; Valsava was represented disinterring at night time horribly putrefied corpses; students were forced to return to relatives the bodies carried away or they were forced to take the bodies back to the places where they had found them, particularly if near to a church. Felix Plater dug graves with his hands; at funerals coffins were robbed of their contents; bodies were stolen from private residences; teachers were tried for the disinterment of an executed criminal and consequent dissection of the body *cum rasuris et cultellis et alii artificiis* (with razors, knives and other means). The chronicles of the times are full of such news, but it was not easy to find the parts of bodies carried away because they were hidden in private houses, where the courses in demonstrative anatomy were given. The Lecturers vied with each other in forming their museums, the only place from which they could daily absorb school knowledge.

Where the intervention of governments was delayed the devotees of a special science compensated for this lack by founding an Academy in almost every city. Thus was founded the "Cimento" in Florence through the efforts of the de Medici family, the "Pontaniana" in Naples, the "Platonica" in Florence, the "Cosentina" in Cosenza, the "Lincei" and the

"Riva" in Rome, and the "Massari" in Bologna, contemporary of the "Philosophers" or "Traccia" of the same city. We owe to these private institutions the rending asunder from the mind of mankind, the long night of ignorance and barbarism.

Fig. 6. Portrait of Jagliaezzo in the Library of the University of Bologna.

Subjects Taught

In the fifteenth century the subjects taught in Bologna were divided into two groups: those pertaining to Law, and those pertaining to the Art; among the latter were included theoretical and practical medicine, surgery, moral and natural philosophy, astrology, logic, rhetoric, and *Ars Notaria* (Notarial Art) which, after the year 1357, was assigned to the lawyers. A chair of Greek lectures was added in 1455, while that of rhetoric had, in 1439, already been divided into poetry, grammar and *Lectura Humanitatis* which rose to such an importance in the fifteenth century as to attract many foreign students. The teaching of Hebrew, Chaldean, Arabic and of *De chronologia et de re diplomatica* (Chronology and Diplomacy) had short duration. Metrology and geometry were first included in astrology and later, mathematics, algebra, mechanics and hydrometry were added. The chairs of physics and chemistry were established in 1737, that of optics in 1756, and that of agriculture in 1781. From 1571 on anatomy was taught separately from surgery, in which it had until then been included, (and a few years later the teaching of *de simplicibus medicinalibus* was given a new title: *ad philosophiam naturalem ordinariam* [*de fossilibus, de plantis, de animalibus*]). The chair *ad operationes chirurgicas* was instituted in 1733, that of lithotomy and ophthalmology in 1765, that of veterinary medicine and surgery in 1784 and, finally, that of *de variolorum inoculatione* in 1770.

Some of Its Outstanding Teachers

Many of the Lecturers promoted to the professorship, with the title of Doctors, were foreigners and salaried by the Commune or Gabel, and it is not difficult to imagine how they were antagonized by the native Doctors who claimed the exclusive right of teaching.

The School of the Arts and therefore of Medicine, flourished about two centuries later than that the Lawyers, that is, in the thirteenth century. It had very capable scholars in anatomy among whom are particularly mentioned: Taddeo of Florence, whom Dante speaks of in the XII Canto of Paradise. His *Consilia medicinalia*, which with a total of 156 having been collected into the "Vatican Code" 2418, are still well known. Taddeo was the true founder of a school which had many followers, and drew from Boethius Latin doctrines. Dino del Garbo, who commented on his Aphorisms, and his son, Tommaso del Garbo, who held the chair of surgery and published "Summa medicinalis," were his pupils, as well as Guglielmo of Saliceto, the anatomist, clinician, sober reasoner, surgeon and author of "Summa conservationis et curationis" and of "Chirurgia." Another pupil of Taddeo was Gentile of Foligno who published under the same title of "Consilia medicinalia" used by his teacher, a collection of practical observations. He also commented on Galen's art, Hippocrates' and Avicenna's Prognostics, and wrote a book on the black plague of which he was a victim in the practice of his studies.

Still another pupil of Taddeo was Bartolomeo of Varignana who continued the work "Consilia medicinalia" and wrote the "Quaestiones super libros Galeni de complexionibus" (questions on Galen's books about complexions). He was one of the most reputable physicians of the thirteenth century and the first one, perhaps, to obtain permission from the Senate of Bologna to dissect a human body publicly. The experimental trend established by him in anatomy found followers in the celebrated Mundino de Luici, otherwise called Raimondo, and in Nicolo' Bertrucci Lombardo, both Taddeo's pupils who continued the work of their teacher. Mundino, too, wrote his "Consilia medicinalia ad varios morbos" (Medicinal advices for various diseases), and commentaries on Galen besides a book on Botany; his major work, however, is the "Anatomia," which was adopted as textbook in all schools.

Taddeo's pupils were, also, the famous surgeon Lanfranco of Milan, author of "Ars completa totius chirurgiae" (Complete work on Surgery) who taught in France, and Ugone Benci of Siena who taught medicine in Bologna, Pavia, Parma, Florence, anatomy in Padua, and commented in "Consilia" on Hippocrates, Galen and Avicenna's art.

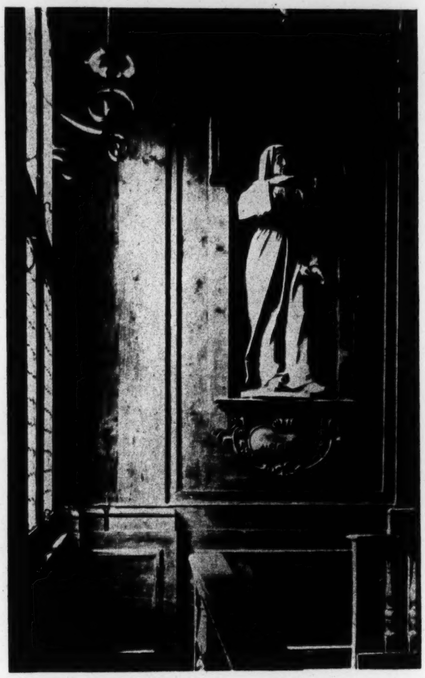

FIG. 7. WOODEN STATUE OF ARGELATA IN THE ANATOMICAL THEATRE OF THE ARCHIGINNASIO OF BOLOGNA.

Between the fourteenth and the fifteenth century we find Pietro di Azzolino of Argelata, to whom a statue has been erected in the Anatomical Theatre of the Archigymnasium. He wrote six books full of observations on "Chirurgia" (Surgery), and embalmed the body of Pope Alexander v leaving with us a complete description of the process. Giovanni of Concorreggio who also

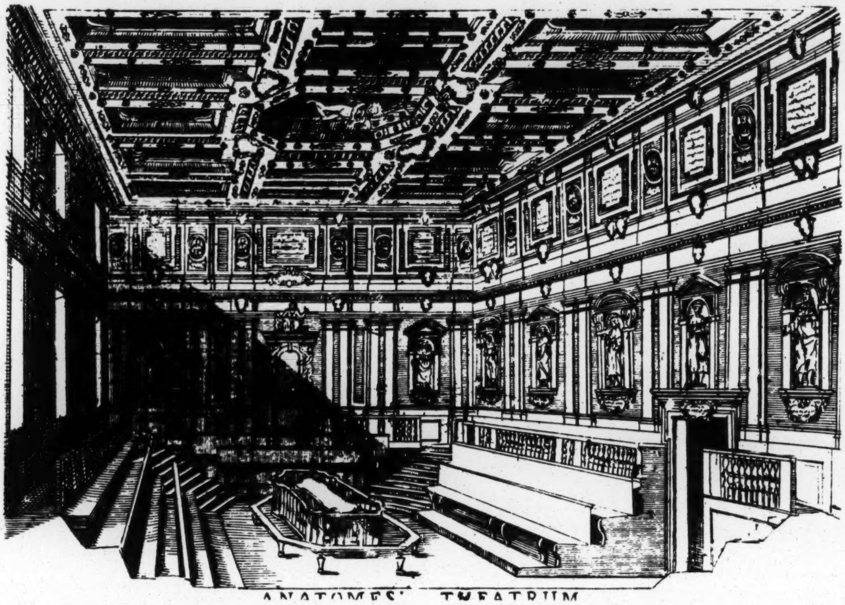

FIG. 8. ANATOMICAL THEATRE IN THE ARCHIGINNASIO, BOLOGNA. (FROM A PRINT ABOUT 1730.)

taught in Milan and Pavia left us several interesting works: "Tractatus de febribus," "Methodus medendi," and "Summula de curis febrium." We are told that Gabriele Gerbi, philosopher, anatomist and physician, of whom we know several works: "Cautelae medicorum," "Quaestiones metaphisicae," "Gerontocomia" and "Opus anatomiae," was called to Constantinople to treat a Turkish gentleman of high rank and that, having cured him, was returning to his own country when his patient had a relapse and died. This gentleman's sons, suspecting that his death was due to the administration of poison by Gerbi, overtook him at sea, sawed his accompanying son alive and inflicted the same penalty on him. His contemporaries were Alessandro Achillini of noble family, lecturer of anatomy in Padua and Bologna, author of treatises of anatomy, and describer of the parotid glands, cecum, choledochus duct, cerebral and spinal nerves, malleus and incus of the tympanum; and Jacopo Berengario of Carpi, Mondino's pupil, brought much honor upon the Bologna School (1470–1530). This year is the four hundredth anniversary of his death. He taught first in Pavia and, perhaps, also in Padua and Paris, then in Bologna, and dissected *plurima centena cadaverum* (more than one hundred bodies), as related by himself. Of his works the most famous are the "Commentaria" on Mondino's anatomy and the "Isagogae." It is said that he, as well as Vesalius, Falloppio and Michelangelo, practiced vivisection, an argument destitute of every foundation as afterward demonstrated.[1]

[1] See Roth in Andreas Vesalius. Vivisection des Menschen in sechzehnten Jahrhundert. Berlin, 1892, p. 473, App. XI.

Bartolomeo Maggi was held in great esteem; he was an archiater of Pope Julius III, surgeon and professor of anatomy, who published an interesting work on fire-arm wounds. Ulisse Aldrovandi was the prince of naturalists, a miracle of doctrine, of whom the University of Bologna possesses the immense volumes on his anatomical studies upon animals and his entire rich museum of natural history.

In the sixteenth century we have Volcher Coiter, a German, who for a short time was lecturer of anatomy in Bologna and published there and in Nürnberg two notable works; and then we have the most distinguished Andrea Vesalio who taught in Padua, Bologna and Pisa, besides in Paris and other European cities.

G. Cesare Aranzio, Maggi's nephew, lectured in Bologna from 1556 to 1588, and created the chair of ordinary anatomy, apart from surgery. He published works on the human fetus, tumors, anatomical observations remarkable for exactness of conceptions, especially in the part referring to intrauterine life.

His contemporary was Costanzo Varolio of Bologna a clever professor of surgery and, later, of anatomy. In 1566 he was crowned with the laurel wreath and a statue in his honor was erected in the Anatomical Theatre of the Archigymnasium. For his discoveries on the brain and the whole nervous system, the special senses, the larynx and the genitourinary organs he well deserves being considered one of the most outstanding anatomists of his century.

Another remarkable man was Gaspare Tagliacozzo in whose memory a statue was also erected in the Archigymnasium. He taught medicine and anatomy from 1570 to 1599 and published a work in two volumes of rare value. Esthetic and repair surgery (plastic surgery) was initiated by him. His contemporary and friend was Girolamo Mercuriale whose vast culture was called "frightful." He taught from 1537 to the beginning of the year 1600, always to a large audience, in the schools of Padua, Bologna and Pisa, and was physician to Maximilian II of Germany and to Pope Gregorius XIII. He died in 1606 leaving many remarkable works on surgery. The century was also illumined by the genius of Fabrizio d'Acquapendente and Falloppio of the School of Padua, and of Bartolomeo Eustachio of the University of Rome.

And the long list still continues. The end of the sixteenth century is honored by Girolamo Cardano, Gianfrancesco Rota and his son Flamino, Antonio and Michele Sacchi, Francesco and Achille Muratori, and by Bartoletti who left many books on medicine and anatomy when still very young, and who died of the plague. The glorious list is closed by Gianbattista Cortesi who taught anatomy in Messina and Bologna until his death in 1634. He contributed many works on medicine and surgery, the most famous of which is "Miscellaneorum decades denae," mentioned by Haller, published in a very limited edition.

In the seventeenth century the chair of medicine passed to the Scotchman Georges Scharpes (Scarpius) and to the Irishman Neil Glacan, while Adriano Spigelia, professor at Padua's School, was rising and with him Carlo Ruini, the keenest zootomist of his time. When Harvey, then twenty, was studying anatomy in the University of Padua, Ruini published the "Anatomy of the Horse," composed of five illustrated volumes in which the study of the heart and of the circulatory movement of the blood was fully described.

A new era was at this time initiated with the creation of the "Accademia de Notomia" which had been wanted by Bartolomeo Massari, and was afterward restricted to nine competent scholars designated by the name of *Coro Anatomico* (Choir of Anatomy).

Among Massari's pupils are found Giambattista Capponi, Carlo Fracassati and, above all, Marcello Malpighi who brought honor to the Bologna School and to Italy, about whom I had the pleasure of writing a modest biography in 1928 on the occasion of the three hundredth anniversary of his birth, 1628. In his name and in his life is contained a monument of greatness whose size I might reduce in an attempt to summarize his complete work. Sbaraglia, an anatomist of the old school, was his most obstinate antagonist, whose name I shall merely mention.

In 1697 the office of Anatomical Prosector was instituted and entrusted to Anton Maria Valsalva, Malpighi's pupil and teacher of the celebrated Morgagni of the Paduan School, a member of the Royal Society of London. An episode of his life is the disinterment of a body in advanced state of putrefaction upon which the alteration of a nerve trunk had to be studied. He died of apoplexy at fifty-seven but will live forever because of his work "De Aure Humana Tractatus" (on the human ear). He divided this work into two parts; anatomy and physiology, while his famous notes from which Morgagni drew his "Duodevigenti Epistolae Anatomicae" are an imposing testimony to the vast and profound critical doctrine of the compiler. His friend and associate in the investigations was Francesco Albertini, also of Malpighi's school, a modest and erudite clinician and anatomist, very sober in his writings: his "Commentario" (Commentary) is so full of profound anatomical observations as to deserve its being placed among its greatest contemporaries. Other celebrated scientific contributors were: Pietro Nanni, discoverer of the glandular follicles and of the pleural alterations, a famous physician, a prose writer and a poet; Matteo Bazzani, a philosopher, and Jacopo Pozzi, a poet and a keen and expert observer. Ferdinando Guglielmini preceded Haller in the study of the function of the intercostal muscles. Gusmano Galeazzi, prosector, chemist, physicist, naturalist and geologist; G. Battista Stancari, chemist and keen student of the meninges; Giacinto Vogli, the author of "Anthropogonia"; Paolo Balbi, physicist; Giovanni Molinelli, who studied the cerebral lobes and the decussations of the cranial nerves; Galli Bibbiena, biologist and naturalist; Giovanni Manzolini, surgeon and anatomist; Carlo Mondini whose study of the appendix we have; Antonio Caldani, an ardent upholder of Haller; and, finally, Luigi Galvani, the famous demonstrator of animal electricity, who closed the cycle of the old lecturers and marked, with Volta, the beginning of a new civilization for the world. Galvani was an anatomist and obstetrician, besides being physicist, chemist and meteorologist.

I would like to add here the names of two women, Laura Bassi, the teacher of Lazzaro Spallanzani, who held the chair of Universal Philosophy from 1732 to 1778, and that of Anna

Morandi Manzolini, who was entrusted with the modeling of the anatomical preparations.

THE ARCHIGYMNASIUM (THE ORIGINAL UNIVERSITY BUILDING)

Among the most famous monuments of the period, the one still existing, perpetuating the history of the glorious vicissitudes of Bologna's School, is the Archigymnasium Palace. It was erected through the indomitable will of Cardinal Pietro Donato Cesi, Bishop of Narni, when papal Vice Legate and governing in the name of the celebrated Carlo Borromeo (nephew of Pope Pius IV) who played a very important part in the resolutions of the Council of Trent. He was a very learned prelate, a scholar of the civil and canon law, and deplored very much the fact that a school so famous throughout the civilized world had to occupy rooms in very modest houses and pay rent besides. He wanted everything united under one roof and as he knew how to find the necessary financial means, asking compulsory contributions even from students and professors, just so he knew how to take personal control of the construction. Thus in a little more than one and a half years the Archigymnasium was erected, a sumptuous monument of architecture and one of the worthiest palaces of the period. The funds and the plans which had been reserved for the construction of another building, Saint Petronius' Church, were used for this purpose. As a result of this the church remains incomplete, a fact worthy of note when one considers that it was due to a prelate. The front of the Archigymnasium is marked by a long portico; inside next to the lobby is a courtyard, austere in lines and, following it the chapel, rich in ornaments and paintings among which is the Annunciation of Calvart. On the sides of this Oratory are the halls for the Rectors, Priors and Counsellors, beautifully decorated with fresco paintings. Everywhere in the courtyard, corridors and on the walls of the stairways and meeting rooms there is a profusion of Doctors' and Pupils' blazons. On the first floor, above the chapel, is the "Anatomical Theatre" or Dissecting Room. We, accustomed to the naked simplicity of the modern anatomical schools, remain very much astonished at the sumptuousness of the seats and the wood carvings decorating the walls and the ceiling. A rich baldachin, supported by two life-size wooden figures, showing the first layer of muscles, indicates the lecturer's chair. Other life-size statues and busts of celebrated physicians and anatomists decorate the walls, mute witnesses for centuries of anatomical meetings, called functions, which were attended by the highest city authorities and a long retinue of ladies in great pomp. These functions lasted ten successive days while in the chapel below suffrage-masses were celebrated.

Another city solemnity was the preparation of the Theriaca, the universal panacea, that attracted the most learned and elegant public. It took place just in the center of the courtyard, the entire portico of which had been decorated with damasks for the occasion. The ceremony was presided over by doctors and pharmacists in rich paludamenta busying themselves with caldrons and stills, all intent in examining with devout scruple the ingredients used and the process followed, while the multitude of liveried servants and chevaliers in powdered wigs helped them.

At present, in the upper halls of the Archigymnasium, a library is located and in every part of it, long rows of legates', teachers', and pupils' coats of arms grace their vast walls: these were saved from destruction by the good sense of the people when toward the end of the seventeenth century the ill-intentioned republican revolutionary spirit of equality was raging.

But the living character of the past cannot always prevent the decadence of posterity: a strange phenomenon that falls fatally upon the ancestors' greatness. Hence we witnessed in the seventeenth and eighteenth centuries, as I have already stated, a progressive decline in education which became infiltrated with the vain appearances that characterized the society of the seventeenth century, whence the sanctity of teaching was lessened by the weakness of the times. Professors, colleges and institutions deteriorated; pupils decreased in numbers and those few whose youth did not favor meditation, abandoned themselves to every sort of unruliness and arrogance. The majority went to other universities that were thriving in every place. The phenomenon became so serious that at the end of the eighteenth century there were scarcely ninety lecturers for less than twice as many students, who, to their boldness, added sarcasm, thus creating the comic character of Dr. Ballanzon, worthy expression of the presumptuous aspect of the empty teaching of the age. The entrance of the French into the city and the change of government, produced even among the students, a sense of rebellion against the old pontifical regime. The University corporations were abolished, privileges destroyed and the coats of arms removed. The Archigymnasium became the seat of the constitutional circle and afterward, completely abandoned, ran the risk of being transformed into a synagogue. It was, however, used for the elementary school for thirty years, that is, until 1838, when it was occupied by the Library.

When we observe today the serious self-possession of the students, moved by respect, in those imposing walls, every corner of which is a book of history, we can hardly understand how the very same places could have become the stage of the impertinent racket of students with the Gabel; and we are inclined to meditate on the fatal course of those centuries when laxity of customs and of constituted powers, a natural reaction against tyranny, remained the arbiter of history. The thousands of students now annually congregating in the University of Bologna again under a free regime pass by almost unconscious of the history of the austere building. They focus their attention on the courtyard. There they may catch a glimpse of the balcony on the railing of which a frog disclosed to Galvani the mystery of animal electricity. They now move on to the city limit, where the Temples of Science are located. Sadly, the Archigymnasium remains, in its vast halls, the solemn guardian of an endless tradition of treasure, of precious incunabula, richly miniated, surrounded by the manuscripts of our great Masters.

THE HISTORICAL POSITION OF COCCIDIOIDES IMMITIS

AMONG THE PATHOGENIC FUNGI OF THE SKIN

By DOUGLASS W. MONTGOMERY, M.D.

SAN FRANCISCO, CALIF.

THE mycoses of the skin are notable in the history of medicine as being the first maladies discovered to be due to specific microorganisms. The idea of specificity was not new; many men of acute observation, profound thought and large experience had held it, but it required an unusual combination of qualities and opportunities to develop and maintain it, and as a matter of fact the teaching of the few who held it made little impression on the mass of the profession.

The first actual cause of a specific disease to be demonstrated was the itch-mite by Renucci in Alibert's clinic in Paris in 1836. The year before, however, a momentous discovery was made, which was to have an important influence on medicine.

In 1835, ninety-six years ago, Balsamo and Bassi discovered a fungus that produced the silkworm disease, called muscardine, that prevailed especially in the neighborhood of Milan. From then on there developed a growing opinion that fungi might be the cause of diseases in the higher animals. Schoenlein of Zürich for instance thought that many of what he called the impetigines had such an origin, and presently he found the achorion in the scutula of favus, and published his findings in 1839.[1] He was far, however, from believing that it was the cause of the disease. He was too deeply imbued with the idea of the dyscrasic origin of disease to admit any such deduction.

We now come to David Gruby, one of the most ingenious, picturesque and versatile characters that has ever joined the medical profession. This man was brilliantly successful as a student, as an investigator and as a practitioner. The son of a poor Jewish Hungarian farmer, as a child he was sent away from home with a trifle of money in his pocket to earn his own living. In later life he became a well known philanthropist, and ended his days as a misanthrope. Although his discoveries initiated the greatest advance that our profession has ever experienced, his death was almost unnoticed in his adopted country, France, not at all in Germany, and almost not at all in Vienna, his university town, and where he secured his first start scientifically and medically.

In 1841 Gruby discovered the achorion of favus independently of Schoenlein, and described it definitely as the cause of the disease. In 1842 he described the Oidium albicans as the cause of sprue, and in the same year he found and described the trichophyton of sycosis barbae. In the following year he discovered the Microsporon audouini, and showed its etiologic connection with a form of ringworm, and in 1844 he described the Trichophyton tonsurans, his last great discovery.

How this remarkable man suddenly ceased to produce scientifically at the early age of thirty-eight, after a life spent in extraordinarily fruitful scientific work with such men as Milne Edwards and Claude Bernard forming his attentive audience, and how his discoveries were misinterpreted or forgotten for half a hundred years until brought to light by Sabouraud about 1892 is delightfully related by J. H. Rille in a sketch of his life.[2]

As indicating how difficult it has been for men to accept the contagious nature of disease Letenneur of Nantes, who succeeded in inoculating man from the ringworm of animals in 1852, did not even then regard the fungus as the cause of the disease, and Erasmus Wilson, good observer as he was, as is shown by his work on lichen planus, remained a stubborn opponent of the idea that the trichophyton fungus was the cause of ringworm. As before mentioned, Gruby closed his career of brilliant discoveries in the year 1844. Pursuing the same path, Eichstedt in 1846, and Burchardt in 1859, demonstrated the presence of fungi in pityriasis versicolor and in erythrasma respectively. In 1857 Devergie, and in 1864 Köbner, demonstrated the presence of a fungus in eczema marginatum, an affection that Hebra previously had described clinically. The idea of specificity was gaining in facts if not in disciples.

We now reach another notable year in medicine and in the history of fungus diseases, the year 1865. A young man named Louis Pasteur was induced to investigate the diseases of silkworms, which were disorganizing the silkworm industry in France. He found one of these diseases, pebrine, to be due to a fungus, and this discovery led him to investigate other diseases occurring in human beings, and in animals. So medicine secured the services of one of the most remarkable geniuses of all time. It was a curious coincidence that the discovery of the silkworm disease called muscardine by Balsamo and Bassi should initiate the study of the pathogenic fungi in 1835, and that thirty years afterwards Pasteur's discovery of the cause of pebrine, another silkworm disease, should lead him into the study of the larger, obscurer, more intricate subject of the true bacteria.

For some time now, although the study of many of the other microorganisms was advancing rapidly, very little was done with the fungi. The ringworms were all supposed to belong to one class, Malmsen's trichophyton tonsurans, until Furthman and Neebe in 1891 cultivated several varieties.[3] Another great investigator was already at hand, however, a man singularly gifted both in his knowledge of the history of medicine and in his power of original thought. This man was Sabouraud, who in 1892 established the plurality of the ordinary ringworm fungi, rediscovered the Microsporon audouini of Gruby, and showed that the fungus causing the eczema marginatum of Hebra was a very special variety.

Sabouraud not only discovered many new fungi himself but he incited others to follow the same path. The idea of specificity was now being rapidly dispersed throughout the world, and the discovery of new diseases was imminent. In 1891 Emmet Rixford and W. S. Thorne found a curious coccidium-like microorganism in the lesions of a patient having an affection of the skin and deeper structures resembling histologically tuberculosis. In 1896 a more extended study of this tissue was published by Emmet Rixford and T. C. Gilchrist, and the disease was called granuloma coccidioides.[4] From time to time other cases continued to be reported, mostly from the San Joaquin Valley.

Early in 1900 a patient died of a curious disease in the wards of the University of California in the San Francisco County Hospital. He exhibited many tuberous lesions of the face, neck and body, and there were clinical signs of pulmonary invasion. His temperature ran a septic course. Dr. H. C. Moffitt recognized it as being a most unusual case, and the autopsy was carefully performed by Dr. W. Ophuls of the Cooper Medical College. Material from the skin tumors, and from various viscera was given to Dr. Rachel L. Ash, then an hospital interne under Moffitt, for culture. She used eight or ten tubes of ordinary agar and bouillon. To her astonishment in a few days every culture surface was covered by a grayish white, felt-like growth, which microscopically showed the mycelial threads common to fungi. It was suggested that the cultures were contaminated with ordinary fungi but she knew that, with the care taken, all the tubes could not have been contaminated. She then injected emulsions of this mold taken from several tubes into guinea pigs. Shortly all the guinea pigs sickened, and showed among other lesions huge hypertrophy of the testicles. The work was repeated with the same results, both in regard to cultures and animals, and it was agreed both by Doctors Ophuls and Moffitt, after the first inoculations, that no contamination was present. Dr. Ophuls, working with the same material, demonstrated in the hanging drop mycelial threads growing out of of the coccidialike bodies, showing definitely the change between the one and the other form of growth.[5] The microorganism had a two-phase character, the one phase taking place in the tissues and the other when growing in the open air. It was also soon recognized that this patient's disease was the same as that previously described by Rixford, Thorne and Gilchrist.

That this California plant should grow luxuriantly in the open air with an abundant supply of oxygen, and should also be able to grow so vigorously in the tissues with a paucity of oxygen as to cause a most malignant disease, was sufficiently surprising. Another surprising fact was that the growth in each situation should be different in appearance, in the open air giving a mycelium and in the tissues coccidium-like bodies.

This microorganism has received the epithet "immitis" (the ungentle) and it certainly deserves the reproach.

In regard to the history of the fungi we were, however, soon to learn more about their adaptability and how malignant some of them can be.

In 1898 Schenck discovered a fungus called sporotrichum, which in 1903 de Beurmann studied more thoroughly, and which is now called Sporotrichum beurmannii. The clinical features arising from infection with this fungus, principally thanks to the industry and cleverness of H. Gougerot, are now well known throughout the world. We have had two cases in California.[6] The chief focus of the trouble, however, seems to be France. The symptoms of this malignant disease are a close mimicry of tuberculosis, and in many instances this affection, which under proper treatment is easily controllable, has been mistaken for syphilis or tuberculosis.

At about the same time this malady was being studied it was found by Bruno Bloch and by Jadassohn that certain of the trichophyton fungi, previously regarded as causing purely superficial affections, could give rise to constitutional symptoms, could enter the blood, could cause allergic phenomena and a series of eruptions called trichophytides. Also, Bloch found that the filtered bouillon of a culture of a vigorously growing Trichophyton gypsum and of some species contained a trichophytine.

During the past few years the study of the pathogenic fungi has advanced very rapidly, so rapidly indeed that the proper study of the fungi alone requires the services of a specialist. As for the symptoms they can produce when growing on or in the human being, they are bewildering in their variety and intensity. They may grow as mere saprophytes, giving rise to insignificant closely restricted diseases such as erythrasma and tinea versicolor, or to physically innocuous though socially important maladies like microsporia, or to obstinate eczemas such as eczema marginatum, or to extensive scar formation as in favus, or to ulcerations and lymphangites like sporotrichosis, or to deadly affections like granuloma coccidioides. In fact they are as various in their manifestations and potentialities as they are in their genera. It would look indeed as if one of the great major diseases, leprosy, might be added to the list. Dr. E. L. Walker, working in the Hooper Foundation, suspects, and with good reason, that this most picturesque and terrible disease may be due to a fungus analogous to actinomyces. Indeed the fixity of the endemics of leprosy in a locality or country, the difficulty of inoculating from man to man, the rarity of contagion, and its almost exclusive confinement to the poor who live and sleep in huts on the ground, permit one to think the pathogenic agent may be an earth plant, growing as a saprophyte, and that it may not be a parasite exclusively human.

Our knowledge of the pathogenic fungi, as outlined here, really starts with Gruby's remarkable discoveries in 1841, only eighty-nine years ago. Succeeding this there was a quiet period extending for nearly fifty years, till Sabouraud's day, about 1892. Our knowledge of the very malignant deep growing fungi, such as the coccidioides "immitis," begins with Rixford and Gilchrist's publication in 1896, later demonstrated as a fungus by Ash and Ophuls, as previously related. Now there seems to be no end to the new disease forms that may be described, the new pathogenic agents that may be discovered, or the new forms of treatment proposed.

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OBSTETRICS IN MEXICO PRIOR TO 1600*

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OBSTETRICS is the most ancient of the medical arts. Childbirth, in all ages and in all lands, has been surrounded by superstition and accompanied by ritualism. The indigenous peoples of Mexico were no exception in this regard.

The long history of Mexican medicine, including that of obstetrics, is entirely different in one of its aspects from that of any other country. The Indian tribes, occupying America north of the Rio Grande, had their own systems of medicine, theological and domestic. These have made no impression upon modern medicine. We have acquired a limited knowledge of the surgical skill of certain tribes as a result of the study of skeletal remains exhumed in various parts of this territory. They have left no medical literature. A few early explorers have recorded their observations concerning the treatment of disease among the Indians with whom they came in contact. The first publication of this character was Jacques Cartier's "Brief recit, & succincte narration," Paris, 1545. This contains a three-page list of the names of the parts of the body in Huron. There are a few passages in the text which have some slight interest to medical historians.

In Mexico, however, the medical arts of the indigenes were gradually merged with those of the conquering Spaniard, resulting in a continuity unknown under similar circumstances elsewhere. Mexican obstetrical history has a printed literature extending over a period exceeding four centuries. The first medical work to be published in the New World, Francisco Bravo's "Opera medicinalia," printed in Mexico City in 1570, contains references to native drugs used in parturition, its sequelae and complications. References to obstetrics in Mexico are found in non-medical works as early as 1524. In Mexico there is a still earlier literature of interest to medical historians and this literature includes material relating specifically to obstetrics.

Much has been written concerning the pre-Columbian civilizations of Mexico and of Central America. This subject cannot be discussed here at any length. No attempt should be made to investigate the medical history of this period without first acquiring a general knowledge of Mexican ethnology, archeology, and linguistics.

When the French, the English, and the Dutch came into contact with the native races through exploration and subsequent colonization of the North Atlantic coast of America they encountered tribes in a cultural state radically different from that of the peoples with whom the Spanish were concerned in Mexico. The former, it is true, had advanced beyond a state of nomadic barbarism. Their progress was largely in the political field. Our knowledge of their religious beliefs, medicine, and history has come down to us in the form of oral legends. The written literature, if such it may be called, consists solely of a few crude pictographs and certain records in the form of wampum belts, etc. These are entirely without significance in medical history.

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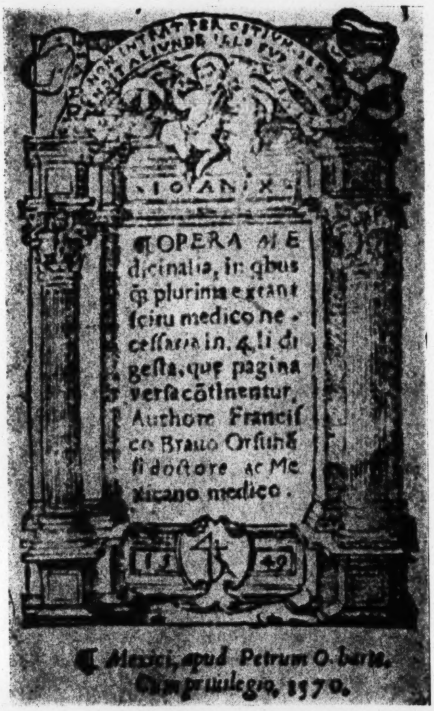
* Read before the San Francisco Medical History Seminar, February 2, 1931, Bohemian Club.



IOAN. X.

¶OPERA ME
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Authore Franciſ
co Brauo Orſunē
ſi doctore ac Me
xicano medico.

1549

¶ Mexici, apud Petrum Ocharte.
Cum priuilegio, 1570.

Fig. 1. Title-page of the First Medical Book Published in the New World, the "Opera Medicinalia" of Francisco Bravo, Printed in Mexico City in 1570. The Woodcut Border, Bearing the Date 1549, Had Been Used on the Title-page of Other Books. From the Copy Belonging to the Late Dr. Nicolàs León of Mexico.

When Cortes reached Mexico, a considerable measure of retrogression had already taken place from a state of civilization and culture which we know must have previously reached a height comparable with that of ancient Egypt and Greece. The chronology of this pre-Columbian era is very uncertain. We do not know whether we are concerned with a few centuries or with many. Origins too are equally hazy. Did a cataclysm engulf ancient Atlantis and a few survivors make their way to Mexico where they imposed their culture upon the aboriginal inhabitants whom they found there? Did these same Atlanteans find Mexico an uninhabited land and were they later over-run by barbarians from the North? Did the ancient Mexican culture drift from Asia across the Pacific, make a slow progress overland by way of Siberia and Alaska, or by way of the stepping stones of Oceanica? Is it possible that we have to do with an indigenous culture; that the resemblances between the artifacts of Mexico and those of Egypt and China are due to like causes producing like results? Such questions for the present must remain unanswered.

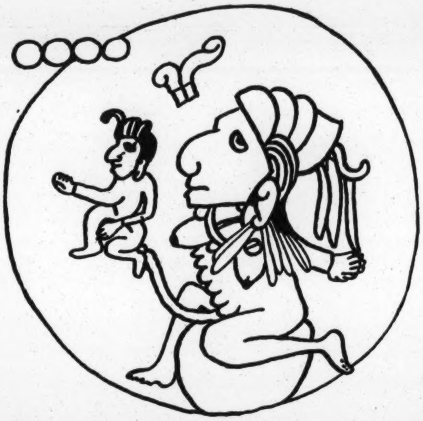

Fig. 2. Parturition as Pictured by the Ancient Mexicans. Pen Reproduction from the *Codex Nuttall.*

Unless future archeological investigations bring to light new examples of the indigenous literature of pre-Columbian Mexico containing information relating to obstetrics our knowledge of the subject must be limited to data derived from two sources: (1) surviving texts from this early period written in various hieroglyphic forms, and (2) deductions made from practices persisting among the inhabitants of the country and carried over from the period prior to contact with Europeans.

The surviving texts include inscriptions upon monuments, and written codices. The latter are of excessive interest. A few statues of this period are of obstetrical interest. There is every reason for believing that the ancient Mexicans, when their culture reached its zenith, possessed a literature in the fullest sense of the word. This existed in the form of written books corresponding to those of other early civilizations such as those of Greece, Rome, Egypt, China, Babylon, and Nineveh. There would be more than a single copy of each work. Libraries were formed by various rulers and by the priestly groups.

This literature has all but vanished. Enough survives to assure us of its importance and to tell us something of its nature. Many reasons exist for the disappearance of the greater part. The long history of Mexico is a story of conflict, consequent plunder and destruction. This continued after the advent of the Conquistadores and persists to the present day.

We are able to determine more concerning obstetrics from a study of the codices than is possible with relation to any other branch of medicine. Why is this so? These codices are pictorial. The phenomena connected with sex lend themselves readily to visual presentation. In common with other early peoples, the Mexicans were intensely concerned with fertility and held the generative organs in high esteem. The act of copulation may be pictured much more vividly than that of ingestion. This is equally true of labor, lactation, the bathing of the child, etc. A pregnant woman can be portrayed much more unmistakingly than can a woman with a headache. It is not unlikely that if we could read these hieroglyphics with greater accuracy some would be recognized as referring to other physical conditions.

Mexico still remains in large part an unexplored country. Recent surveys of the jungle made possible by the use of the aeroplane have revealed hitherto unknown cities while excavations already made in Mexico City and elsewhere in the republic suggest the possibility that an extension of such investigations will result in discoveries of incalculable importance. May we hope some day to have available for study a complete library of this remote period?

The existing codices are of uncertain date. Most of these are attributed to the fifteenth and sixteenth centuries. A few are known to be of later date. The fact that such a book is physically assigned to the sixteenth century is irrelevant as to the date of its textual origin. We have a number of early manuscripts of the Christian scriptures. All are copies and none older than the third century. In comparison with a printed book, the manuscript is much more likely to disappear. Fewer copies were made. Time has taken its toll.

In January, 1930, I had my first and only opportunity to examine an early Mexican codex. This was a typical example of its kind. It was probably a manuscript of the sixteenth century. The hieroglyphics were written in three colors, red, blue, and yellow, upon thin sheets of skin. Each leaf, in size about 6 by 8 inches, was attached to the following one with leather thongs in a manner distinctive with the ancient Mexicans. Leaf one was inscribed upon the verso only, leaf two upon the recto, and so on alternately. The attachment of the first two leaves was at the inner edges, of the second and third leaves at the outer edges. This being continued through the book results in a volume which when closed takes the usual form but when opened displays the entire text simultaneously upon a series of pages arranged side by side.

This form of binding together the sheets of a manuscript has a significance to bibliographers. What was its origin? The Hebrews wrote upon a long sheet of vellum which was then rolled into a scroll. The Egyptians used single sheets of papyrus. These if fastened together at all were attached at one side and opened like a modern book. Early European manuscripts (Greek and Roman) were gathered in the same manner. The Chinese and the Japanese, however, used a very thin paper. The pigment, with which their writing was done, penetrated through the sheet. This made it necessary to use only one side. The writing was consequently carried out upon a series of sheets or rather a series of pages were written side by side upon a wide sheet. This was folded so that the blank side was within. When bound, the typical Chinese or Japanese book, although it may be leafed through as may a Western one, consists of leaves made up of two sheets joined at the margin. The Mexican codex when opened and the Chinese book before binding are identical in arrangement. It appears likely that the form of these codices originated under an Asiatic influence. Since sheets of skin were used this form was not dictated by the same circumstances as determined the format of the Chinese book.

The principal Mexican codices are:

The Codex Borbonicus. This is a work on divination and ritual. A facsimile with commentary by Hamy was published in Paris in 1899.

The Codex Fejervary-Mayer. This pre-Columbian pictorial manuscript is in the Liverpool Free Public Museums. Facsimiles were published in Edinburgh, 1901–1902, in Berlin, 1901, and in Paris, 1901. Each is accompanied by a descriptive text by Dr. Edward Seler.

The Codex Magliabecchiano. A post-Columbian manuscript now in the Biblioteca Nazionale, Florence. A facsimile was published in Rome in 1904.

The Codex Nuttall. A facsimile wsa published in Cambridge, Mass., in 1902, by the Peabody Museum of American Archaeology and Ethnology. This has an introduction by Zelia Nuttall.

The Codex Peresianus. An hieratic manuscript now in the Bibliothèque Nationale, Paris. This was reproduced in facsimile in 1888 (second edition) at Saint Valery en Caux. There is an introduction by Leon de Rosny.

The Codex Telleriano-Remensis. A facsimile with an introduction by Hamy was published at Angers in 1899.

The Codex Vaticanus. No. 3773. This was reproduced in facsimile with an elucidation by Dr. Seler at Edinburgh in 1902–1903. A German edition was published in Berlin in 1902.

The Codex Borgiano. This manuscript from the Museo Etnografico della S. Congregazione di Propaganda Fide was reproduced in facsimile at Rome in 1898.

The Codex Cospiano. A Nahuan manuscript now in the Biblioteca de la Universidad de Bolonia was reproduced in facsimile in Rome in 1898.

The Codex Fernandez Leal. This was published in facsimile by the Mexican Government in 1895.

The Codex Cortesiano. A Mayan manuscript.

The Codex Misteca. The Mexican Government issued a facsimile in 1900.

The Codex Sierra. Fragment. *Ca.* 1550–1564. Published in Mexico City in 1906.

The Codex Mendocino.

The Codex Texcoco-Acolman.

All of these codices are significant in the study of the early medical history of Mexico.

The two ancient races of Mexico concerning which we have the most knowledge are the Nahua and the Maya. The earliest chronicler to record anything of value relating to the obstetrical practices of the native peoples of Mexico was Bernardo de Sahagun. His "Historia general de las cosas de Nueva Espana" is available in a number of editions. It is included in Kingsborough's "Antiquities of Mexico," London, 1830–1848. The best edition is that with notes by Carlos Maria de Bustamente, published in Mexico City in 1829–1830. A French edition with notes by Jourdanet and Simeon was published in Paris in 1880.

Sahagun's account of the religious ceremonials which accompanied the announcement of a woman's pregnancy is quoted *in extenso* by Dr. Nicolas Leon in his "Obstetricia en Mexico," Mexico City, 1910 (pp. 4–12). Such a celebration included ritualistic observances during which Quetzacoatl, creator of the first man and woman (Omeciuatl and Ometecutli) was invoked in behalf of the expectant mother and her child. The neighbors brought to the expectant parents gifts of food and drink, flowers, and incense. There was general feasting and drinking.

The midwives (Ticitl) cautioned the pregnant woman not to overheat herself before the fire, not to expose herself to the rays of the sun, not to sleep during the day lest the face of the child about to be born should be deformed, not to chew tzictli (chicle) which might sicken the child, and to take plenty of nourishment in order that she be able to better endure the trials of labor and to properly nurse the child when born. Many things were to be avoided lest the child be born a monster. The desire to eat earth must be resisted since whatever was ingested by the mother was incorporated in the fetus.

During the first three months of pregnancy intercourse with the husband was permitted in moderation. Unless this was done the child when born would be sickly and of little strength. Intercourse near the time of parturition was prohibited. In general the prospective mother was counseled to eat well, to rest physically and mentally, and to engage very moderately in manual labor.

At certain intervals during pregnancy, especially during the last three months, the midwife administered to the pregnant woman a number of vapor baths. The apparatus used for this purpose was known as Temazcalli. One form of such a bath is pictured in the *Codex Magliabecchiano.* Francisco Clavijero in his "Historia antigua de Mexico" describes another form of Temazcalli. This was built of adobe brick somewhat in the form of the native bake-ovens and was about 8 feet in width and 6 feet high. The floor was convex. The bather was seated upon the elevated central area while water containing medicinal herbs occupied the lower circular area. Beneath the floor was a furnace which furnished the heat necessary for vaporization. These baths were under the protection of Yoalticitl, goddess of baths.

When the pains of labor were manifested, the woman was given the juice of the plant, Chihuapatli, to drink. This was said to possess the power of causing contractions which expelled the fetus. The herb Montanoa tomentosa and other substances mentioned by Dr. Francisco Hernandez in his "Rerum medicarum Novae Hispaniae" were used for the same purpose. Tlacuatzin (Didelphis californica) was held to be a very potent ecbolic.

Our knowledge of the position assumed in labor by the women of ancient Mexico is derived from a number of statues and from the various codices. Leon gives an illustration showing a Nahuan statue of the goddess, Ixcuina, protectress of parturient women. She is shown in the last stages of labor. The figure is in a squatting position with the arms extended to the rear and the hands pressed against the buttocks. The head and hands of the child are shown protruding from the pudenda. This statue is admirable in execution. The muscular effort attending parturition is strikingly reproduced with remarkable anatomical accuracy. The head of the goddess is thrown back and the face is distorted with pain.

In the *Codex Nuttall* a mother is shown in this same squatting position: the child has been born but the umbilical cord is uncut and is shown together with the placenta.

From the frequency with which the squatting position in labor is exhibited both in ancient Mexican statuary and in the pictographs of the codices, to the almost complete exclusion of other obstetrical positions, this must have been the typical position among the native races of Mexico.

It is well known that this position is taken instinctively by parturient women of many semi-civilized and barbarous peoples. (See Witkowski[1] and Englemann.[2]) This seems to be the natural position rather than the lateral or dorsal decubitus which have become more or less fixed in modern obstetrical practice.

The only other obstetrical position encountered in ancient Mexico is the erect or semi-erect in which the woman is suspended or clings to a rope. Modern obstetrical positions have probably been dictated by esthetic considerations and not by any inherent advantages which they may possess.

Nahuan mythology has many gods and goddesses with attributes pertaining to the functions of generation and birth. Sterile couples offered their prayers to Quetzatcoatl. The priests of this god invoked his aid in the increase of fertility among the people by making his image from corn-meal mixed with the blood of young children. This similacrum was then symbolically killed by being pierced with an arrow. The heart was then offered to the king to eat while the rest of the body was distributed among the people.

In common with other ancient races, the organs of generation were venerated by the Mexicans. Phallic emblems reminiscent of those excavated at Pompeia and Herculaneum are common both as statuary and in the codices.[3]

In the *Codex Borbonicus* there are pictographs of men with enormous phalluses, an unmistakable representation of a pregnant goddess, and the figure of the wise king of Texcoco, Netzahualcoyotl, bearing a war-shield upon which appears the vulva. The *Codex Magliabechiano* has a conventionalized figure of the vulva and phallus conjoined. Uxil (Sarcorhamphus papa) in copulation with Pek (Canis caribeus) is shown in the *Codex Dresdensis* in a series of pictographs which includes Pek similarly engaged with a goddess, and Uxil likewise occupied.

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[1] Witkowski. Histoire des accouchements. Paris, 1887.

[2] Engelmann. La pratique des accouchements chez les peuples primitifs. Paris, 1886.

[3] Herculaneum et Pompei. Musée sécret. vol. 8, Paris, 1840.

After the conquest and evangelization of the natives in Mexico, many Spanish customs were adopted. Catholicism was readily accepted since it included many elements which at least superficially were familar to the indigenes. The ancient Mexicans were confirmed ritualists. Infant baptism, the veneration of images, sacrifices, sacred shrines, the burning of incense, vestments, all these, were a part of their religious tradition. The practice of medicine was a priestly function with both the Nahua and the Maya.

The native medicine and surgery were immediately of interest to the Spanish priests, many of whom were also physicians. The earliest printed medical works in Mexico were in large part the work of the clergy. To these writers we are indebted for much of the knowledge which we now have of the native pharmacopoeia and to them we are under obligation for the introduction of many useful drugs into our own materia medica.[4]

Childbirth was surrounded by numerous superstitions, some of which still survive in Mexico. Among the Mexicans, a woman dead in labor was the object of excessive veneration. Even one of her fingers was prized as a talisman which would make a warrior invincible. After the death of a parturient woman, her relatives and friends were able only with difficulty to prevent the mutilation of the cadaver.

One of the strange superstitions which still survives in Mexico is that of the umbilical tree. This belief, in part, may be met with in many lands. Occasionally a tree from which a branch has been torn exhibits a scar bearing a likeness to the human vulva. That such a phenomenon should attract the attention of primitive peoples might be expected. Such trees have been venerated and made the center for various fertility rites.

In January, 1930, I visited such a tree in Mexico and observed the strange purpose to which it had for many years been put. As far as I have been able to determine this is not to be met with elsewhere. The tree in question was literally covered with umbilical cords, some shriveled with age, others comparatively recent. The exact significance of this is unknown to me but I have reason to believe that the natives consider the hanging of the umbilical cord upon such a tree important in the preservation of the health of the mother and child.

The aid of the goddess of fire, Xiuhtecutli, was sought during labor. The native physicians and midwives were zealous in such idolatry. The rites included offerings of food and drink.

Labor was assisted by abdominal massage and the manual dilation of the vulva. If parturition was prolonged, pressure was applied by the midwife who used her feet for this purpose. In addition to the drugs mentioned elsewhere the woman was given decoctions of cola, chocolate with pimenta, or cihuapatli (Montanoa tomentosa). The vulva was fumigated with the vapor from boiling rue (Ruta graveolens).

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[4] For a detailed account of this early literature see Nathan van Patten's "The Medical Literature of Mexico and Central America." *Papers of the Bibliographical Society of America*, vol. 25, 1931.

The cord was usually cut with a fragment of obsidian or the sharp edge of a palm leaf. A metal knife was proscribed as its coldness was thought to injure the child. After cutting the cord was tied with a black thread. Any other color was considered detrimental.

It was customary for the midwife to preserve a fragment of the umbilical cord from the part nearest the fetus. This was highly esteemed as a remedy for many diseases. The placenta was either burned or secretly buried.

The child was bathed immediately after birth. Its mouth was cleansed, the midwife using her finger dipped in vinegar for this purpose. Purulent ophthalmia was of frequent occurrence and to combat this the eyes were washed with a decoction made from the seeds of *ojo de venado* (Mucuna pruriens). Lactation was prolonged among the Mexicans and contrary to general opinion does not seem to have been a barrier against another pregnancy. Among the Mayas, an image of the demoness, Ixchel, was placed beneath the nuptial bed to assure conception.

Mayan babies were carried by their mothers tied to a board. Another shorter board was attached to this one at the head in such a maner as to come down over the forehead and bridge of the nose. In this way through the constant pressure the bones were so shaped that from the crown of the head to the tip of the nose there was a flattening into one diagonal plane.

With the Tarascos, marriage usually took place when the female began menstruation, which was usually at the age of twelve. The males married at about fourteen. The latter were little concerned about the virginity of their brides. Defloration was common before marriage.

When the bride became pregnant, female relatives immediately began a systematic preparation in order that a satisfactory termination might be assured. Massage was given at regular intervals. It was considered possible thus to determine the position of the child. The pregnant woman was allowed to rest as much as possible and great care was given as to her food and drink.

This is not the place to discuss the unsettled question as to the origin of syphilis. The disease under the designation, morbus gallicus is mentioned, however, by the earliest Spanish physicians in Mexico in their books published there. The morbus gallicus was believed to exist in two forms, no distinction being made between syphilis and gonorrhea. The former strangely enough was known to the early Mexicans as "ingles." Guaiac was the standard remedy.

The printed literature relating to obstetrics, as has been previously noted, began in 1570. Prior to this, books printed in Europe referred to the indigenous systems of medicine in Mexico and to the medicinal plants found there. Important titles in this category include Diaz del Castillo's "Historia verdadera de la conquista de la Nueva Espana," 1519; de Benavente Motilinia's "Historia de los Indios de la Nueva Espana," 1524-41; de la Casas' "Brevissima relacion de la destruycion de las Yndias," 1552; de Mendieta's "Historia ecclesiastica indiana," 1544; Lopez de Gomara's "Historia general de los Indias occidentales," 1565; Wateson's "The Cures of the Diseased in Remote Regions," 1598.

The Spanish clergy in Mexico after the conquest compiled numerous vocabularies of the native languages. These are of course invaluable in the study of the indigenous medicine since they are our principal means of identifying diseases and remedies known to the early Mexicans. Two of the principal publications of this character are Andres de Olnos' "Grammaire de la langue nahuatl" (written in 1547 and available in an edition published in Paris in 1875) and Alonso de Molina's "Vocabulario de la languae mexicana y castellana" (published in Mexico in 1555 and reprinted in Leipzig in 1880).

In addition to Bravo's book, the following works were printed in Mexico prior to 1600:

Alonso Lopez de Hinojoso. "Suma y recopilacion de cirugia," 1578. Augustin Farfan's "Tractado breve de chirurgia," 1579. "Tractado brebe de medici," 1592.

Juan de Cardenas' "Primera parte de los problemas y secretos," 1591.

All of these books are of interest to the historian of Mexican obstetrics. They mark the transition from native medicine to European medicine. The latter was markedly influenced by the earlier Mexican systems.

The question may be asked, Why concern oneself with the medical practice of these ancient peoples and particularly why are we concerned with their obstetrics? No answer can be made to the physician who can ask such a question. Medicine and surgery are ancient arts brought into being in response to one of the first laws of Nature, that of self-preservation. None of the sciences is new and it is not possible for any man to point to a single individual as the first chemist, the first physicist, or the first physician. Similarly it is impossible to say of a particular event that it was the beginning of chemistry, physics, or medicine. Each of the sciences is a hazily defined entity stemming back to a parent science whose origins are lost in the mists of pre-history.

A sure knowledge of the present must be based upon the firm foundation of an awareness of the past. All good things are not new. Systematic study of ancient medicine is likely to result in the rediscovery of many lost threads in the web of the medical fabric.

We know that the natives of Mexico and of Peru were familiar with drugs of the highest value and still in daily use in modern medicine. For each of these, a dozen or more other remedies are known by their Nahuan or Mayan names alone and remain unrecognized as to their source or use. Our knowledge of epidemiology will be greatly enlarged by a study of the many epidemics which raged in Mexico prior to and after the conquest. Finally we have a great neighbor to the south, a neighbor with whom we have a constant and increasing traffic. Much of Mexico remains still an unknown terrain. The old customs have persisted there, including those pertaining to diseases and their treatment. It is incumbent upon us to gain a knowledge of these things which have an immediate importance to our own health and welfare.

Of the various branches of medicine, obstetrics alone may be investigated in a period remote from the date of the conquest because as was stated at the beginning of this paper, it lends itself to pictorial representation. Its phenomena are common and intimately related to the life of all peoples. This has resulted in the survival of many ancient practices so that the medical historian, the physician, and the ethnologist find in the obstetrics of contemporary Mexico (native) a clinic rich in material for the synthesis of a knowledge of the subject in the Mexico of antiquity.

MEDICAL INCUNABULA IN THE UNIVERSITY OF CALIFORNIA MEDICAL SCHOOL LIBRARY, SAN FRANCISCO*

ALBERTUS MAGNUS. De c[o]elo et mundo. Venice, Gregorius fratres, 1495.

Fol., Goth. Char., 65 lines, 74 leaves. Hain 512; Huntington 7.[1]

AVICENNA. Fen prima quarti canonis, with commentary by Jacobus de Partibus. Lyon, Johan Trechsel and Johan Klein, 1498.

Fol., Goth. Char., 2 col., 73 lines, 140 leaves, illum. initials, copious mss. notes. Crummer book-plate. Hain 2214; Huntington 89.

GANDAVA (JOHANNES DE JANDUNO). Quaestiones super tres libros de anima Aristotelis. Venice, Johannes de Colonia and Johannes Manthen of Gheretzheim, 1480.

Fol., Goth. Char., 2 col., 54 lines, 158 leaves. illum. first page and initials, mss. notes, contemp, binding. Deposited by Prof. C. D. Leake. Hain 7460; Huntington 307.

GERSON, JOHANNES. Incipit tra/ctatus venerabilis Magi/stri Johannis Gerson cā/cellarij pisieñ. de cognitõe/castitatis, et pollutionibo/diurnis. [n. p., n. d.]

Sm. Quart., Goth., Char., 2 col., 30 lines, 14 leaves. Hain 7701; Proctor 1275. From Dr. Le Roy Crummer; ascribed by him to Michael Wensler, Basel, 1480–1490. Copy in Army Medical Library, ascribed to Ludwig von Renchen, Cologne, 1495. Not in Huntingdon or College of Physicians of Philadelphia.

LACTANTIUS, LUCIUS COELIUS FIRMIANUS. Opera. Venice, Simone Bevilacqua, 1497.

Fol., Rom. Char., 45 lines, 140 leaves, wood-cut initials. Of medical interest is: De opificio Dei vel formatione hominis. Hain 9818; Huntington 315.

MESUE DAMASCENUS, JOHANNES. Mesue cum additionibus Francisci de pedemontium. Et ad/ditionibus Petri de Apano. Et cum commento Dini super/Cano. generales. Et cum cōmēto Christophori de honestis/sup. Antidotariū Mesue. Platearius super antidotariū Nicolai/Et Saladinus de componendis medicinis. Venice, Peregrinus de Pasqualibus, 1489–1491.

Fol., Goth. Char., 2 col., 57–60 lines to text, 71 lines to commentary, 358 leaves. Hain 11110 (from which it differs slightly). Not in Huntington. College of Physicians of Philadelphia 270.

PLINIUS SECUNDUS, CAIUS. De naturali historia. Venice, Bartholomaeus de Zanis, 1496.

Fol., Rom Char., 62 lines, 234 leaves, wood-cut initials. Deposited by Prof. C. D. Leake. Hain 13100; Huntington 410.

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[1] Incunabula Medica in the Huntington Library, compiled by H. R. Mead, *Huntington Library Bull.*, 1: 107 (May)1931. 532 titles listed. If several editions are possessed, only the first is given. Probably have well over 650 medical incunabula. Is this the largest and most representative collection?

* List compiled by Miss Edane Rowell under the direction of Dr. Sanford Larkey, Assistant Professor of Medical History and Bibliography.

[From Nüremberg Ghronicle, 1493.]

[From Schenckius: Observationum Medicarum, Francofurti, 1609.]

EDITORIALS

HARVEY IN ABERDEEN

FOUR years ago the medical profession throughout the world celebrated in various ways the Tercentenary of William Harvey's publication in which he enunciated the correct explanation of the circulation of the blood. At the celebration of this great event in medical history by the Aberdeen Medico-Chirurgical Society a paper was presented by one of its members, Dr. W. C. Souter,[1] which dealt with an obscure event in his career and, as every circumstance bearing on Harvey's life is of importance, we deem this of sufficient note to direct attention to Dr. Souter's most valuable contribution. He presents a photographic reproduction of an entry in the Burgess Roll of the City of Aberdeen dated August 30, 1641, which states that on that date William Harvey was made a burgess of the "Burgh of Aberdeen." Attention was first directed to this fact by Dr. J. F. Kellas Johnstone in an article published in 1912.[2] Dr. Souter has attempted to clear up the circumstances concerning Harvey's visit to Aberdeen and why this honor was conferred upon him. We know that Harvey accompanied Charles the First on his journey to Scotland for his Coronation in 1633, and Souter quotes the statement that Harvey was "the personal friend of his king, and accompanied him everywhere," therefore, we may presume that he was with Charles when he revisited Scotland in 1641, but there is nothing except this record in the town archives of Aberdeen to suggest that he did so. The records of St. Bartholomew's Hospital show that in 1633, Harvey asked and received permission to absent himself from the Hospital in order that he might go with the King, but there is no such record as regards the journey of 1641. The Honorary Burgesses' names were entered by the town clerk, the roll not being signed by them, until as late as 1866, when King Edward VII, then Prince of Wales, inaugurated the practice of having those upon whom the honor was conferred sign the roll themselves. Dr. Souter concludes his most interesting article with a description of a painting of Harvey, which was given to the Aberdeen Medico-Chirurgical Society in 1815, by Sir Walter Farquhar, to whom it has been presented by the third Lord Bessborough, which he considers on good grounds may possibly be an original portrait of its great subject. The portrait is reproduced as a frontispiece to Dr. Souter's article.

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[1] Dr. William Harvey and Aberdeen, by W. C. Souter. Repr. from *Aberdeen Univ. Rev.*, November, 1931.

[2] *Aberdeen Daily Journal.*

BOOK REVIEWS

CALIFORNIA MEDICINE (A REVIEW). By John W. Shuman, M.D. N. Y., A. R. Elliott Publ. Co., 1930.

Beginning with a very brief summary of the methods of treatment employed by the Indians, Dr. Shuman divides the medical history of California after its occupation by white men into four periods: (1) From the discovery of California in 1542 until the arrival of Friar Junipero Serra and his associates in 1769. (2) The Spanish Period, 1769 to 1822, when California was under Spanish rule. (3) The Mexican Period, 1822 to 1848, during the domination of Mexico. (4) From 1848, when the Americans occupied California to the present time. The first regular physician to arrive in California was Dr. Pedro Prat, a graduate in medicine of the University of Barcelona, who arrived at San Diego in 1769, and died there two years later. Prat was the first of a line of surgeon-generals who ruled the medical destinies of California until the Spanish regime was ended in 1824. Dr. Shuman gives brief notices of Pablo Soler and several other of the more notable of these worthies. The last of the royal surgeons was Dr. Manuel Quixano, and some of his office furniture which is still in the possession of his family is pictured in the pages of this book. No medical men of outstanding merit distinguished the Mexican period in the history of California.

Certain very interesting features marked obstetric practice in California at this time. It was customary on such occasions to have two midwives, a woman midwife, called a partera, and a man midwife, or partero. The latter was usually some old Don, who by long service in the lying-in room, had secured some local reputation. The woman in the throes of labor was invariably placed in a kneeling position on the floor, which was covered with a blanket. She supported herself by clinging to a reata or rope attached to the ceiling. During a pain the partero seated behind her held her in his arms, and pressed down with his hands upon her abdomen. The partera, squatting in front, endeavored to assist the expectant mother by dilating the mouth of the womb, rupturing the membranes and supporting the perineum.

One of the most picturesque characters dealt with by Dr. Shuman was Dr. Richard Somerset Den, an Irishman, the last surgeon-general under the Mexican regime. Another was John March, of whom Dr. George D. Lyman has recently published a most delightful biography, recently reviewed in these ANNALS.[1] It is a pity that more space is not devoted to the records of the medical men who flocked to California when it became a part of the United States and whose energy and ability founded medical institutions which survive and flourish to the present day. Beverley Cole, Elias S. Cooper, Hugh H. Toland, Levy Cooper Lane, and others should have their lives and accomplishments thoroughly recorded. The same may be said of the portions of the book devoted to the medical education, where the accounts of the beginnings of the medical college of California are all too brief for the importance of their subject. Dr. Shuman calls his book a review and hence the reader should not expect a detailed history of California medicine but one cannot but regret that the Author did not write more fully on the many interesting topics which are aroused in the pages of his summary.

[1] N. s. 3:356, 1931.

JOHN HEAVISIDE, SURGEON. By George C. Peachey. London, St. Martin's Press, 1931.

In his most delightful and authoritative book, "William and John Hunter," Dr. Peachey not only revealed much new material on those two distinguished brothers but shed so much new light on the whole history of anatomy and surgery in the eighteenth century in England that anything that he may choose to write on that topic will be read with interest. The subject of this memoir was not a great man in any sense of the term but his biography brings us in touch with the medical history of the period by several curious sidelights which it casts upon it. John Heaviside was the son of a man who practiced surgery at Hatfield and was so successful as to leave a considerable fortune to his son. Peachey can find no evidence that he ever received any kind of diploma or degree. The son studied surgery under Percival Pott, served as house-surgeon at St. Bartholomew's Hospital, and received a diploma at Surgeon's Hall. He was surgeon to the First Troop of the Grenadier Guards for some years. After his retirement from the army Heaviside practiced in London, residing in a large house in Hanover Square. Here he had a museum, the bulk of which was made up of the collection of Henry Watson, the distinguished surgeon, many of the best preparations in it having been made by Watson, or by his pupil Sir Anthony Carlisle. The original catalogue of Heaviside's museum is in the Royal College of Surgeons of London and bears many interesting annotations made by William Clift. The specimens on its shelves were many of them most bizarre and of more morbid than scientific interest. Heaviside belonged to the famous Eumelian Club, a literary group which included Sir Joshua Reynolds, James Boswell, Dr. Lawrence, Sir George Baker, Mr. Seward and Dr. Burney. Heaviside was Surgeon-Extraordinary to George III; he succeeded John Hunter on the Court of Assistants at the College of Surgeons, and he was a Fellow of the Royal Society. In 1803 he was surgeon to Captain Macnamara in the famous duel in which that officer engaged with Lt. Colonel Montgomery. Heaviside was obliged to pass a week in Newgate for his participation in this affair. Emma Hamilton, Lord Nelson's mistress, was among Heaviside's patients. Although he never attained any scientific distinction John Heaviside's contacts and his course of life were such as to make this memoir well worth while and about a seemingly insignificant character Peachey has evolved a very interesting historical contribution.

DIE WUNDERHEILUNGEN VON EPIDAUROS. EIN BEITRAG ZUR GESCHICHTE DER MEDIZIN UND DER RELIGION. By Rudolf Herzog. Mit einer Tafel (Philologus, Supplementband XXII, Heft III). Leipzig, Dieterich'sche Verlagsbuchhandlung, 1931.

The shrine of Asklepios in Epidaurus since the fifth century B.C. has exercised a not inconsiderable influence upon the culture of the Greeks and other Mediterranean peoples. It was, like Lourdes in our own time, a place of pilgrimage for the sick whose cures were recorded in stone by the Epidaurean priests. Unfortunately many of these lapidary documents were destroyed. When Pausanias visited Epidauros about 165 A.D. only six steles remained. Of these six the noted archeologist Kavvadias (died 1928) was able to unearth three in a complete state of preservation and some fragments of a fourth. They have been reproduced in the Inscriptiones Epidauri by Hiller von Gaertringen, and thence rendered into German by the author of the book under review. The records represent chiefly testimonials of grateful patients who were cured by a visit to the Asklepian shrine. In their extravagant praise they remind one of the testimonials as to the virtues of patent medicines seen in the old fashioned almanacs and in some newspapers. A few specimens from the 66 so far recorded will suffice to illustrate both the types of disease and the grateful feelings of the believers.

> A man came to the God as a suppliant. He was so "one eyed" that he had only lids and nothing behind them. Some of the people in the Shrine rebuked him because of his simplicity in believing that he could see inasmuch as he had not a trace of an eye, only the place therefor, but as he slept in the sanctum he had a vision. He dreamt the God had cooked a remedy and had opened his eyes and had poured it in. When daylight came the man walked forth seeing with both eyes.
>
> Heraius of Mytilene. This man had no hair on his head but an abundance on his chin. As he was ashamed because people laughed at him, he slept in the sanctum. The God annointed his head with a remedy and caused the hair to grow.
>
> Under a rock the son of Aristocritos of Halius. The boy had swum out into the ocean. While diving he reached a dry spot completely surrounded by rocks. He was unable to find a way out. Thereupon his father, who was nowhere able to find him, slept with the God in the sanctum and had a dream. He dreamt the God led him to a spot and showed him his son. On issuing forth from the sanctum he followed a path through the rock and found his son on the seventh day.
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> Gorgias of Herakleia, pus. This man had been wounded in the lung in battle with an arrow and had discharged pus for a year and a half in such quantity that he filled sixty-seven basins with it. While sleeping in the sanctum he had a vision. He dreamt the God removed the arrow head from the lung. At daybreak he came forth healthy and sound with the arrow head in his hands.
>
> Kephisias, foot. This one ridiculed the cures of Asklepios and said "If the God says he has cured the lame he lies; if he had this power why did he not cure Hephiastos?" The God did not conceal that he intended to make him suffer for his blasphemy. While Kephisias was riding he was kicked by his bukephalus and received a crippled foot. Later the God, after Kephisias had prayed many times for forgiveness, made him again well.
>
> Agamede of Keos. This one slept in the sanctum on account of barrenness and had a dream. She dreamt a snake was lying on her belly and thereupon she had five children.
>
> A maiden, dumb. As this maiden slept in the sanctum she saw a snake crawling down from a tree in the grove. In great fear she cried out, calling her mother and father, and went home cured.

Mankind has not changed greatly since the days of the Shrine at Epidauros. The few dozen cures that are annually achieved in Lourdes in Herzog's opinion spread more faith than the thousands of failures spread disbelief, for among the common people the voice of scepticism can never silence the cry for relief from pain and suffering.

Neither Aristophanes, who made sport of the cures, nor the atheist Diagoras was able to shake the faith of his contemporaries in miracles, nor the cynical Diogenes who said to someone who was marvelling at the votive tablets at Samothrace, "There would have been many more if those not cured had also erected tablets." Faith in miracles is too strongly rooted in the soul of man to be easily eradicated; that is why it exists in our day and will continue to survive for centuries to come.

The Temple of Epidauros had from 12,000 to 15,000 seats, which is the more remarkable as it was situated in an isolated valley far from cities of any size.

The latter half of Herzog's book is devoted to an interesting and learned commentary in which he cites a number of instances of superstitions and alleged miracles of a later period. Perhaps one attributed to Swedenborg because of that dreamer's interest for Americans is worthy of record here. It is cited by no less a personage than Immanuel Kant:

> Madam Marteville, the widow of a Dutch envoy at the Swedish court, was pressed by the family of a goldsmith to pay the balance of a silver service that had been made for her. The lady was convinced that the debt had been paid by her husband during his life but she could not find any proof among the deceased's papers. She

related her troubles to Swedenborg with the request that if what was said of him was true, he should communicate with the spirit of her husband in order to learn all he could concerning the matter of the goldsmith. Swedenborg promised to do so and a few days later came to the lady's house and told her that he had made the inquiry and that in a secret drawer in her husband's desk which it was believed had been thoroughly examined, she would find the necessary receipt. She immediately followed his directions and found the receipt in the secret drawer.

The monograph of Herzog which in its small compass contains so much of historic interest closes with the imperishable words of Hippocrates:

> Wisdom must be joined to medicine and medicine to wisdom. For a philosophical physician is like unto God. Everything belonging to wisdom is comprised in the healing art—absence of avarice, reserve, shame, dignity, judgment, tranquility, purity, sensible speech, abstention from loudness, freedom from superstition, recognition of the divine omnipotence.

David Riesman.

One Hour of Medical History. Compiled by Benjamin Spector, M.D. Boston, The Beacon Press, Inc., 1931.

This little book records the performance of a pageant of medical history at Tufts College Medical School, which was so successful that it has been repeated before several medical societies. The characters impersonated were Hippocrates, Maimonides, Vesalius, Paré, Harvey, Sydenham, Pasteur, Lister, Amos Twitchell and Ehrlich. Each of the actors spoke a few appropriate lines indicating his part in the progress of medical science. The originator of the Pageant introduced each performance by some comments "on the geography of those countries which gave rise to medicine and kept it in progress, using a large colored chart to show the historical zone of the ancient world." The lines which he wrote for the participants are noteworthy for the excellence with which he has condensed appropriate matter. Pageants representing phases of medical history have been presented before and have proved of interest to those who have witnessed them. They are of obvious utility in the celebrations of medical institutions, particularly when there are laity in the audience. Dr. Spector gives a model to follow on such occasions.

Typhoid Fever, Its Nature, Mode of Spreading and Prevention. By William Budd, M.D.R.S. N. Y., Am. Pub. Health Assn., 1931.

Delta Omega has laid the profession under a great obligation by the reproduction of this great medical classic, published under the auspices of the American Public Health Association. William Budd was born at North Tawton, in Devonshire, the son of a surgeon who brought up seven out of nine sons to the medical profession. He studied medicine in London and Paris, passing four years in the latter's medical schools. He received his M.D. from Edinburgh in 1838. After practising a few years in his native town Budd settled in Bristol where he passed the rest of his professional life. In 1873 he published the work which is here reproduced which reprinted the substance of many papers he had previously published in various medical journals. In it he seeks to prove that typhoid fever is communicated by contaminated water, hands, bedclothing, food, etc. His views met with much opposition but his book now reads as though it might have been written with the most up to date data. Budd's methods of studying the problem are most original for his day. It is high time he was accorded the overdue recognition that this book should bring him.

ANNALS OF MEDICAL HISTORY

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Editor: FRANCIS R. PACKARD, M.D., Philadelphia

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